Spring, 2025 Syllabus
CHEN 4530: Chemical Engineering Design Project

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Class Meeting Times/Dates

- Tuesday & Thursday (8:30 a.m. - 9:45 a.m.; 001; 10:00 to 11:15 a.m.; 002)
- Class is in-person (JSCBB A108)

Students are expected to attend class on:

- The first four "In-class lecture" days (including the presentation on Artificial Intelligence)
  - Tuesday/Thursday, January 14th /16th: Syllabus & Project Review
    - Team selection begins Thurs Jan 16th, must be finalized before class on Tues Jan 21st.
  - Tuesday, January 21st: Project Selection
    - Teams & projects finalized.
    - Team must introduce themselves to their industrial liaison by Wed Jan 22nd (Prof. Weimer cc'ed).
  - Thursday, January 23rd: Responsible Use of AI Workshop
- All "Oral Presentation" days; four total:
  - 1st Orals: February 25, 27 (snow day Mar 4).
  - 2nd Orals: April 15,17 (snow day Apr 22).

Attendance is *not* mandatory on "Optional group office hours" days, on these days groups will have scheduled times that they can come in and ask questions if they wish. If a group does not show up for their time slot, other groups are welcome to use that time to ask questions. Also, very important, no separate office hours are scheduled, so it is best to make the scheduled group office hours times.

Diversity, Equity, and Inclusion (DEI)

Prof. Weimer and TA Thomas have drafted DEI related information concerning people who have had significant achievements impacting U.S. history and global scientific understanding. We will load a specific DEI related file each week or two to Canvas for class review in honor of these people. In general, instructors are asked to provide DEI related activities/events, but typically few know what to do (including us), or don't do anything. This is our attempt. Enjoy.

Zoom if Sick

Students are expected to attend class via Zoom if class is ever held remotely (due to Prof. Weimer, having CV or something), otherwise this is an in-person only class. See attached preliminary schedule (there are only 4 classes required for attendance in addition to the first 3 or 4 organizational days; includes AI). Please, do NOT come to class if you are sick (you will be

able to remote in via Zoom during team presentations, yours or others, if you are sick and presenting or observing).

Zoom Link for Class:
The zoom link will be assigned prior to each class that may need it.

Course Communication

Canvas will be used for class communications. Emails to the class list will be limited in order to reduce the number of emails (avoid complaints about too many). So, it is your responsibility to know what is going on in the class and the due dates for assignments. Please check Canvas.

Course Objectives

- Complete a well-defined, team-based chemical or chemical and biological engineering process design project, including process material and energy balances, equipment design, and economic analysis, and write a detailed project report.
- Provide a culminating major engineering design experience that incorporates appropriate engineering standards and constraints and is based on the knowledge and skills acquired in earlier coursework.
- Emphasize safety, standards, ethical responsibilities, and impacts of engineering solutions in global, economic, environmental and societal contexts.
- Review and apply prerequisite knowledge, including material and energy balances, fluid mechanics, heat transfer, separations, and reaction kinetics, in conceptualizing chemical processes.
- Utilize software and prepare a Gantt chart for team project management.
- Employ AutoCAD Plant 3D or other software for schematic diagrams.
- Carry out economic analysis for an engineering process, including capital cost, variable cost, cash flow, and profitability analysis.

ABET Student Outcomes Addressed

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(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
(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
(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
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Prerequisite

CHEN 4520 Chemical Process Synthesis (C- or higher)

Simulation, Design, Costing, and Economics Software

Microsoft Excel™, AspenHYSYS™, AutoCAD Plant 3D, ASPENPLUS™, Super Pro Designer™, PYTHON, and MatLab are available.

Important – While videos/tutorials for software are available, there will not be any organized support for simulation/programming issues. Students are expected to learn new simulators on their own but can ask for assistance on specific issues. Prof. Weimer will organize support for specific groups that may need specific support for the software above. However, in general, no support will be given by Prof. Weimer or TA Thomas to work to debug or code programs, etc. – this is the 4-person team's responsibility.

Support

We will be using the AIChE rules with the exception that each team will have a liaison to support direction to complete the project, rather than no liaison as stipulated by AIChE. Per AIChE guidelines, Chemical Engineering Departments, including advisors, faculty, or any other instructors, cannot provide technical aid specifically directed at the solution of the problem. For example, if the problem statement asks for students to design a Hydrogen production process, faculty members should not be directly telling the students how to design this process or suggesting to them which process to use. Students are encouraged to ask generalized questions to faculty members while working on this problem. For example, if students are designing a Hydrogen production process and they have 2 production methods in mind, the students may ask a Faculty Member with expertise in Hydrogen production about their experiences working with the different methods so that they can make an informed decision on which method to choose for their design.

Text: Product & Process Design Principles (4th Edition)
W. D. Seider, et al., 2017 (John Wiley)

Artificial Intelligence (AI)

Contrary to some other classes, students are encouraged to use AI as a help in carrying out the chen 4530 capstone design project, with a certain caveat. Citations are required for background information and for any design assumptions requiring a citation. Students need to check any citations provided by AI and should have reviewed the specific citation. Students should not assume that the AI is correct, and just use it. Students will be given guidance on using AI with an AI presentation during the first two weeks of class. In talking to external liaisons and companies, they want their students to know how to use AI effectively. So, instead of policing the use of AI, in this class we will be encouraging its proper use. TA Thomas will provide an overview of AI on Thursday, January 23, in a mandatory class attendance.

Academic Dishonesty, Ethics, and Discipline

Any discovered act of academic dishonesty by a student in this course will be reported to the Boulder Campus Honor Code Council. Additionally, the course instructor will report the incident to the Academic Ethics Committee of the Department of Chemical and Biological Engineering. This Committee will recommend to the instructor whether a sanction should be applied to the student. Typical sanctions may range from a zero on an assignment in question to an F in the course.

Group activities (team projects) in which a student asks another student in their work group for a helpful suggestion on the group project is encouraged and should be done as a priority. Student

teams asking a CU faculty member for insightful considerations is not an unethical incident and is encouraged. Student teams searching the Web of Science, library reference texts, or search engines is encouraged, but requires proper referencing in reports. Student teams asking their team liaisons about the project is encouraged. With the exception of liaisons and other CU faculty members, student teams seeking help from outside people without first clearing it with Prof. Weimer, is an unethical act (e.g. going to the network Reddit and seeking answers from individuals or entities is considered an unethical act; certainly, paying for any support is an unethical act – this was actually attempted a few years back).

It is extremely important for the learning value of this class that no one attempts to obtain prior year design projects that may have similarity to current projects. Such activity will be considered unethical and dishonest. Any direct plagiarism from the web, prior reports, journal articles, or elsewhere is considered academic dishonesty. Plagiarism will be monitored with available software and includes published papers, web sites, and prior team reports for CU and other universities. Student teams submitting final reports with plagiarized information in them will receive reduced grades up to and including an F for the team.

Overall Course Grading/Schedule

Oral Presentations- February 25, 27 (1st Orals, snow day Mar 4); April 15,17 (2nd Orals, snow day Apr 22)

7.5% - First Oral Project Review (February 25, 27); ppt slides electronic; Prof. Weimer needs the slide decks to be uploaded to Canvas prior to 7:00 am on the day of the talk (for both sections). We are doing 4 or 5 talks per day in order to minimize everyone's time, but this needs to be well-orchestrated and everyone needs to be on time – starts at 8:30 am and 10:00 am, respectively. It is anticipated that grading input will be obtained from all liaisons and students present, but Prof. Weimer determines the final grade. Important – if the decks cannot be uploaded to Canvas for some reason, send the Powerpoint Deck to Prof Weimer via "CU Large File Transfer" (not Google or anything else for file transfer!). Prof. Weimer's computer will be used for presentations due to time issues for the class and Zoom with external liaisons.

7.5% - Second Oral Project Review (April 15, 17)

15% -*Bi-weekly Progress Reports and PowerPoint Slide Decks* (minimum two files due Thursdays, February 6th, February 20th, March 6th; March 20th, and April 10th at 11:59 pm; 1 electronic pdf file submitted to Canvas and liaison (this is important); size limited to 2 pages, 12 pt Times New Roman font, single space, pdf; Appendices attachments as desired as part of file). Teams need to organize ppt slide decks for these liaison meetings to present to their liaisons and to organize discussion. These slide decks will also be submitted to Canvas - along with the biweekly reports and attached files. The biweekly progress reports and the ppt slide decks to the liaisons and Canvas (Prof. Weimer), per the above schedule, need to include: (1) progress made over the prior 2 weeks – "Progress" section, (2) a plan of activities for the subsequent 2 weeks – "Plan" section, and (3) questions to the liaison – "Questions" section. These bi-weekly reports will be graded and commented on. Note that student-liaison interaction will be included in the grading in the overall Final Report Grade (this will be 10% of the final report grade, i.e. the team's interaction with liaison, bi-weekly progress reports and remote meetings are the major part of that) as well. So, the bi-weekly reports and ppt slide decks should have three sections: 1)Progress, 2) Plan, 3) Questions.

Short Team Meetings with Prof. Weimer: When there are no oral presentations, Prof. Weimer will schedule 10 to 15 minute meetings in A108 with teams in order to answer any questions that may arise. Also, some days may be open office hours where teams are not scheduled.

20% - Peer/Instructor Review: Allocation of the total points given to the team (20% of the grade in this class for each student) for the design project will be distributed individually based upon a confidential peer reviewed written evaluation from the team members themselves and the instructor's input based on the evaluation of what each team member contributed to the project. There will be three peer-reviews with points split as 5%, 5%, and 10% at approximately the 1/3, 2/3 and end of the project time frames: due Friday February 21st (5%), Friday April 11th (5%), and Tuesday, May 6th (10%). *Anyone not completing a peer-review will be docked 1 class percent for not turning it in – these are important.* Each team member will evaluate each team member's contribution, including their own and describe in writing why the points should be distributed as they indicate. The instructor can modify these scores on the basis of his perceived positive or negative contribution of their work to the value of the team project. The total team percent will be divided based upon this method. All team members are encouraged to work hard together towards a common goal and to allocate work evenly. It is important for students to recognize the importance of teamwork as this is the primary mode of operation in industry today. Many companies have actually eliminated individual performance awards in lieu of team awards.

50% - Final Report (submitted to Canvas, due Thursday, May 1st; at 11:59 pm); **the team is required to receive a passing grade on the final report in order to pass the class**, **independent of peer reviews**. Also, note that the team is required to do a final oral presentation using Zoom (or other software provided by liaison), to their liaison's group, but this must be done some time between Monday, April 28th, and Tuesday, May 6th. There is no final exam in this class. Input will be solicited from the liaison, but Prof. Weimer determines the final grade. ***Important: a passing team final report grade is required for all team members to pass the class - independent of peer-review, orals, or bi-weekly reporting. Consider that you are a consulting company that is providing a report to a paying client – it's all about the report for your consulting company and the client, not about your specific contribution.***

3% Bonus Points - Degree Program Feedback (3 total class bonus points for doing this); The Department External Advisory Board will hold student interviews on Thurs, April 3rd. Students will need to be both (1) interviewed by an Advisory Board member and (2) complete the feedback form online to receive the 3% bonus.

Grading Summary
15% Bi-weekly Progress Reports and PPT Slide Decks
15% Class Oral Presentations
50% Final Team Project Report
20% Peer/Instructor Review
Extra Credit 3% Senior Exit Survey

The overall course letter grades will be assigned in accordance with overall numerical grades. Breakpoints between letter grades will be determined by the instructor, but are anticipated to be straight grading.

90/93.33/100	A-, A
80/83.33/86.67/89.99	B-, B, B+
70/73.33/76.67/79.99	C-, C, C+
60/63.33/66.67/69.99	D-, D, D+

< 60 F

NO LATE SUBMISSIONS TO CANVAS WILL BE ACCEPTED FOR ANY REASON because you are on a team; make sure to have a backup and a backup of the backup. When Canvas "times out", no additional submissions can be made regardless of the reason (for instance, it was done but not turned in; our submitter got sick; turned in the wrong file; missed one file by accident; it was my fault, not theirs). This class is a trial of the professional world. The professional world values punctuality very highly.

Talk with the instructor AHEAD OF THE DEADLINE if there are extenuating circumstances warranting a deadline push, but none are anticipated.

Attendance and late Excuses

Classroom (or Zoom, if remote) attendance during the student team presentations is important for the learning value of the class (to see and understand all of the projects taking place) and for having input in the presentation evaluations. All team members must be present for the oral presentations of their team and must take part in the actual presentations. The only excuses accepted are medical, immediate family death, specific religious, or some pre-scheduled acceptable reason. **Interviews are anticipated and encouraged; however, they need to be scheduled around the specific dates of the oral presentations (avoid job or grad school interviews on Feb 25, 27 or April 15, 17).** Plan accordingly. Team oral presentation scores will be decreased by 25% for each person not in attendance (in person or Zoom if sick), for a 4 person team. Do not let your teammates down. All team members are expected to be in-class for all of the presentations done on the day of your team presentation. We are limiting this to only those teams presenting due to possible CV-19.

Major – Design Project

There are different major design projects with corporate or government labs organized for each class section. Design project teams of preferably 4 students will collectively do the project. The primary contact for direction concerning the project itself will be the sponsor project liaison. Most communication with the project liaison will be done via E-mail **and weekly/bi-weekly Zoom/TEAMS Presentations that should accompany the bi-weekly progress reports**.

Team Selection: Design projects will be outlined on Thursday a.m., January 16th, and teams of preferably 4 students will be organized by the students themselves (**note that the number of allowed teams is based on the number of available projects**). Student teams will be organized prior to class on Tuesday, January 21st preferably organized by end of day, Thursday, January 16th, and will then go through the process to select their Final Design Project assignment in class on Tuesday, January 21st. Teams are organized to select projects. Professor Weimer does not intend/desire to place students on teams, but will be required to do so if students are left without a team. In that case, students without a team will be randomly placed on teams (e.g. to make a 4-person team), or, placed on a new team. Prof. Weimer maintains the option to reorganize teams as necessary throughout the semester, **potentially resulting in some students working with fewer team members (for instance, on 2-person teams) or even on their own**. If a student is removed from a team they may work on the same project but report to the course instructor rather than the liaison and give their oral presentation on a different day than the original team. They may also carry out a separate project.

Design Project Characteristics: Every design project has been screened in order to ensure that the project has sufficient difficulty to provide effort for up to 4 students. Prof. Weimer has rejected some project submissions for this reason. Since it is anticipated that some projects will be more highly sought after than others, a fair method will be used in deciding final team/project selection. **IMPORTANT** – ***An attempt has been made to ensure that all projects require comparable effort. In reality, this is difficult to achieve, and, in the end, some projects will most likely be considered more difficult than others (individual perception). All teams will have identical class deliverables. Student teams will have an opportunity to modify and tune the final report rubric for grading to make it as fair as possible reflecting their effort. This will be done 3 weeks before the final report is due.***

Tuesday/Thursday, January 14th /16th

On Tuesday and Thursday, January 14th and 16th, we will review class expectations, the Syllabus and project descriptions/liaisons. More project detail will be provided on the 16th. A substantial amount of time will be allocated to teams trying to self-form at the end of class (last 30 minutes or more). It is preferable that teams self-organize to teams of 4, prior to Tuesday, January 21st (use Canvas, only onto teams where team membership is agreed to). Teams will self-organize using Canvas.

Tuesday, January 21st

Project Selection – 6 teams total will have formed prior to class for section 1; and 11 teams total for section 2). If there are any individuals without teams, they will be randomly assigned to teams. Information will be sent out to those looking for teams or to organize new team (teams will be finalized prior to Tuesday, January 21st). Important – Prof. Weimer will ask for two teams from the 10 am section to switch to the 8:30 time (they will still have chemical engineering project selected during the 1st and 2nd weeks) in order to limit the days for oral presentations to be limited two days and to provide for more liaisons to attend.

Fair Project Selection Methodology

Projects are selected IN PERSON by teams at the start of the semester (3rd class); teams must be organized with project preferences before class on this date. The method below is based on 20 years of experience and is not perfect, but nobody – including students – has been able to come up with something better. Also, note that three teams have brought projects in – everyone had an opportunity for this.

The method of project selection is as follows:

1. Each project will be available for selection except those pre-assigned (every student had an opportunity to bring in a new liaison and project for their team).
2. Instructor will write down all the projects on the board.
3. Each team will write their group # next to their 1st choice of project on the white board.
4. Each team will draw a number (wrapped up paper in a jar) that will indicate the order in which that team's highest priority project will be selected (i.e. their 1st choice project will be determined).
5. If no one else has placed a 1st choice on that particular project, that team will be assigned that project; if others also have this as a 1st choice, there will be a coin flip to decide which team will be assigned that project.
6. Once the project is assigned, all teams that were not assigned that project but had it as their 1st choice will move their 1st choice somewhere else.
7. The team with the next number drawn will then have their highest priority project determined by coin flip if need be, and the process will be repeated.

Note that the course instructor maintains the option to change this entire procedure, particularly number on a team, depending on how many students register for the class. So, it is best to have your teams organized ahead of time.

All about teams

This semester is all about teams. Teams are required to use their team for all of the Q&A. Teams are encouraged to meet at class time since everyone is available. Liaisons are instructed to only take questions from the team and NOT individuals on the team (in order to ensure that teams have thought together about the issues). Liaisons will be instructed to try to meet with the teams via Zoom which CU licenses, or some other media format – once a week or once every two weeks. Communication between the liaison and the team is important; bi-weekly reports and slide decks are a big part of this. Liaisons will take questions during the weekly team meetings and so teams are encouraged to organize questions and submit them to the liaisons prior to the weekly meetings. Teams will need to determine on their own how to organize the workload.

Team Introductions to Liaisons: Teams will introduce themselves via an e-mail to their industrial liaisons (Prof. Weimer copied) by 11:59 pm Wednesday, January 22nd.

Student-Liaison Interaction

It is critical to understand that the performance and interaction of our teams with our liaisons is paramount to the external perceived quality of our program and the decision of companies to hire our students. *This course with all of these external projects/liaisons is unique and provides for an incredible opportunity that is not available elsewhere.* Please take advantage of it and do your best to honor our tradition of providing well-trained students to employers.

The professional liaisons are providing input in their free time without remuneration and expect the student project team to work independently to find data, generate assumptions, and prepare models. The liaison(s) will provide weekly or bi-weekly "office hours" (times TBD, possibly using ZOOM) to provide background information, answer questions, and resolve ambiguities. The student project team should come well prepared to these meetings to make the most of their time with the liaisons and should send 1-2p of prepared questions to the liaisons at least one day prior to office hours (Note office hours can be changed based on students and industry advisor's schedules). Student teams should also have a Powerpoint deck prepared beforehand to present at their liaison meeting in order to make sure their time is well spent with their liaisons. It is advised that the team first discusses questions internally within the team, before submitting them to liaisons. It is extremely important in the professional world to come prepared and it is expected teams will use "facetime" with their liaison efficiently. The liaisons realize that, during the discussions, additional questions may come up and they should be asked. The liaison for this problem will work with the students to ensure that appropriate "facetime" is available, but the students need to plan ahead as well. Liaisons have jobs and often travel and so students need to not delay in preparing questions (do not delay until the last minute) as liaisons may not be available. Again, the students should discuss issues internally first and then seek outside verification. The industry liaison looks forward to efficient and effective communication with the students.

CHEN 4530 Class Deliverables

- Bi-weekly written progress reports as noted in the Syllabus (schedule and proposed content).

- Two Oral Project Presentations as noted in the Syllabus.
- A final presentation needs to be given at the liaison's facility and to the liaison's department, if local; or via video teleconference if not local.
- A final written team project report is due with specifications noted below.

CHEN 4530 Final Report Deliverables – this is independent of and beyond whatever is specified by the Liaison.

- An Executive Summary, including a specific recommendation on the project.
- Project description and scope complete with background, environmental and other relevant information (literature and patent bibliography is required).
- Cited references are needed throughout the report, particularly any place where the team makes an assumption in order to support your decision. Be very careful here to artificial intelligence (AI) as you cannot assume that it is correct – you need to back it up with citations that can be checked – preferably peer-reviewed papers from the Web of Science or Google Scholar. Just to be clear, this is a key aspect of the report as those reading it (decision-makers) will want to know "why" you did certain things.
- Background on the technology.
- Safety Issues, including what is the "worst case scenario and how to defend against it ever happening" as well as other aspects learned in 4520.
- Impact of the Project (required by ABET): What short-term and long-term effects will the proposed solution to this problem/project have on the world and/or the nation? How will it affect society? How will it affect the environment? Strengths/weaknesses? Costs/benefits?
- Summary list of the initial data, assumptions made (battery limits – both process and economic) and their rationale, the proposed process configuration and a description of the approach.
- Gantt Chart for Team Organization, including tasks and deliverables.
- Process flow diagrams with complete material and energy balance; PFD.
- Process simulation (e.g. Aspen HYSYS, Aspen Plus, Super Pro) based on model reaction and major unit operations, or, spreadsheet calculations if simulations could not be done.
- Description of the process and equipment specifications design, materials of construction, etc. (note proper design employing both material and energy balances, models for chemical reactors, methods for design per guidelines and heuristics learned in 4520), reactor/unit operation design based solely on residence time and volume is unacceptable – a better understanding is needed of heat transfer, mass transfer, kinetics, etc. Equipment design is a time-intensive process (this is typically much more effort than the process simulation).
- A mathematical modeling element for some aspect of the project consisting of differential or algebraic equations describing some unit operation or aspect of the process/project; solved using Matlab, Python, Polymath, or some other equation solver. This is a requirement.
- Utility listing for each piece of equipment and a utility summary (consider heat integration to improve efficiency).
- Capital investment and costing comparison.
- Variable and Fixed Operating cost estimate.
- Profitability analysis including IRR, NPV, ROI.
- An economic sensitivity analysis.
- A self-contained Homework Problem and detailed solution developed based on the design project (thought needs to be put into this, what is the learning value for a design

student in 4520/4530?). Provide something that is specific to your work - already done - and can actually be used, not an afterthought to fulfill a requirement. A tutorial type of solution is preferred. This should not be new work, but rather taking what has already been done in the project and writing it up as a HW problem with a solution.

- A complete appendix with all equipment design, utility estimates, and economic evaluation calculations summarized in detail (if not included in the report).
- An electronic copy of all files in the report to be submitted to the class Canvas Site – Word, pdf, Excel, AspenHYSYS, AspenPLUS, Super Pro Designer, Project, Polymath, MatLab, Python, …

Schedule Summary

- Tuesday, Jan 14: Syllabus, Course Objectives, and overview of Project Descriptions (class); team organization.
- Thursday, Jan 16: Final team building, hopefully, if required; continued review of projects with Q & A.
- Friday, Jan 17: signed Class Honor Code submitted to Canvas (by 11:59 pm); required for enrollment.
  Tuesday, Jan 21: Project Selection (class).
- Wednesday, Jan 22 (11:59 pm): due date for sending e-mail introduction to liaison(s).
- Thursday, Jan 23: Artificial Intelligence (AI) presentation in class & Economics Spreadsheet Review
- Thursdays, February 6, February 20, March 6; March 20, and April 10 at 11:59 pm - Bi-weekly Project Progress Reports (2 page limit, 12 pt font, single space, any appendices) and PowerPoint slide decks due at 11:59pm. Submit to Liaison and to Canvas. It is recommended that Progress Reports reflect: (1) Progress – what was done in prior 2 weeks; (2) Plan – what will be done in next 2 weeks; and (3) Issues/Questions that need resolved; Attached Appendices can include more details of deliverables, etc.

Recommended General Timeline for Work Done – Bi-weekly Progress Reports to Liaisons and Prof. Weimer (Gantt Chart based on this schedule; note that this is a recommended schedule and ***each project might be different***)

February 6 – Gantt chart completed, Background Completed & Process Conceptualized with Liaison Agreement; substantial progress on battery limits/project premises.

February 20 – PFD Defined, Detailed Project Battery Limits/Premises Defined/completed & Liaison Agrees; Material and Energy Balances started; any Heat Integration started.

Tuesday, Feb 25: 1st set of 1st Oral Presentations (in-person, zoom for some liaisons)
Thursday, Feb 27: 2nd set of 1st Oral Presentations (in-person, zoom for some liaisons)
Tuesday, Mar 4: Possible Snow Day

March 6 – Material and Energy Balances (simulation) in progress; any Heat Integration in progress; equipment design started; math modeling under way.

March 20 – Material and Energy Balances (simulation) and any heat integration completed; Equipment Design underway; Economics/Cost Methodology Defined; math modeling continued; Equipment Design Completed; Economics started and in-progress.

April 6 – Economics and Project Near Completion; Write-up underway.

April 1, 3, 8, or 10 (TBD): Degree Program Feedback (3 total class bonus points for doing this); The Department External Advisory Board will hold student interviews on one of these days. A room will be set up for this. The department will set up a calendar for students to sign up for

slots. Students will also be provided with a "feedback" form of questions to answer. In order to receive the extra 3 bonus overall grade class points, students need to complete both the "feedback" form and the interviews with the external advisor committee (mainly industrial alums).

Tuesday, April 15: 1st set of 2nd Oral Presentations (in-person, zoom for some liaisons)
Thursday, April 17: 2nd set of 2nd Oral Presentations (in-person, zoom for some liaisons)
Tuesday, April 22: Possible Snow Day

April 20 – Economics done, project completed, Write-up done and being reviewed.

Thursday, May 1 (11:59 pm) Electronic (all files – Word™, Excel™, ASPEN™, HYSYS™, VISIO™, MATLAB™, etc.) files submitted to Canvas and liaison.

Peer-review: due Friday February 21st (5%), Friday April 11th (5%), and Tuesday, May 6th (10%).

Very Important: Monday April 28 to Tuesday, May 6 - the student teams are **required** within this 1-1/2-week period to schedule and to make a 45 minute team oral presentation with the local liaison's corporate or gov't lab team. **Powerpoint slide decks used for the presentation are to be submitted to Canvas by Tuesday, May 6 at 11:59 pm. Or, if not able, sent to Prof. Weimer via CU Large File Transfer.**

Scheduling of 1st and 2nd Oral Presentations

The specific scheduling of the 1st and 2nd oral presentations is based on the availability of liaisons to attend. If students have issues with specific days for athletics, other reasons, they need to let Prof. Weimer know by Thursday, 5 pm, January 30th. Further, every attempt will be made to avoid a conflict of the day for a team presentation if a student has some particular issue – interview, etc. but this cannot be guaranteed. If you know you are traveling for an interview or something, Prof. Weimer needs to know prior to scheduling presentation days. Important – the intention is for in-class presentations with liaisons present. In the past, many external liaisons would travel for this. If we have an issue due to CV-19 where we cannot insure substantial liaison attendance, the presentations might be done remotely. This will be determined.

Zoom

CU licenses Zoom. Students need to follow the simple instructions on the OIT link to create a pro account for free through CU.

Student team members will be able to schedule meetings and are to be the host for team meetings with their liaisons. Teams are required to have bi-weekly updates with their liaisons and to use Zoom or other presentations with their liaisons on at least a bi-weekly basis. Important – avoid conflicts with scheduled Professor-Team meetings.

Files for Oral Presentations

Student teams need to upload their Powerpoint oral presentation files to Prof. Weimer by 7:00 am of the morning of the scheduled oral presentation (**this is for both sections**). We will use Prof. Weimer's computer, not the team's. This year we will be attempting to overcome audio issues for liaisons being able to hear presentations without students needing to hover over the computer – we will see how this works out, but know that Prof. Weimer is working on newer technology to overcome this issue. Use CU Large File Transfer if having issues uploading to Canvas (do NOT use Google, etc. for file transfer)

Issues/Opportunities with Industrial Liaisons

(1) The liaisons have jobs and professional responsibilities and may have their own business meetings. Do NOT plan on a liaison being available anytime you want. It is important that teams schedule meeting times far ahead! Liaisons are providing time for you beyond their own job requirements and so, please, be appreciative of their time.

(2) *Liaisons have very high expectations* and operate in an industrial setting where employees are fired for not doing their jobs as expected; Prof. Weimer is very familiar with one major chemical company that fires 5% of their employees annually based on a forced evaluation system; the bar increases as employees are employed longer and are paid more

(3) The opportunities provided by 4530's industry sponsored projects and oral presentations before panels, final presentations to liaison's at their facilities, weekly meetings, etc. are among the best opportunities available to find employment (many students have found employment in this manner, including some of this year's liaisons). All of the liaisons are doing "process engineering" in one form or another, which is what this class is emphasizing.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit Honor Code for more information on the academic integrity policy.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, please advise Prof. Weimer so that supporting accommodations can be made.

Accommodation for Religious Obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation in a timely manner. In this class,

please advise Prof. Weimer of any issues so that supporting accommodations can be made.. See the campus policy regarding religious observances for full details.

Preferred Student Names and Pronouns
CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Classroom Behavior
Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy.
For more information, see the classroom behavior policy, the Student Code of Conduct, and the Office of Institutional Equity and Compliance.

Spring CHEN-4530 Honor Code

The required signed Honor Code should be submitted to Canvas ASAP (by Friday, January 17th at 11:59 pm at the latest)

Spring 2025 CHEN 4530 Honor Code

On my honor, as a University of Colorado at Boulder student in the Department of Chemical and Biological Engineering, I will neither give nor receive unauthorized assistance in CHEN-4530 for the capstone design project. Specifically, I will not attempt to obtain or use any prior year's course project information that may be available to me through personal contacts or organized filing systems whether electronic or paper. I understand that course work submitted by me, if contrived/completed/written in part or in whole by someone other than myself, shall be considered to constitute fraud under the University Honor Code, and will result in the assignment of an 'F' for the entire course. I understand that plagiarism for the capstone design project report will be investigated using software available to the University of Colorado. Likewise, all aspects of the Team (typically 4 students) capstone-design project will be reviewed and discussed by all team members even though certain team members may focus on specific areas of the team mini-design project. I understand that a passing team project report grade is required to pass the class independent of any other scores. I understand that 20% of my grade in CHEN-4530 is based on a peer/instructor - review within my team per the guidelines in the Syllabus. I understand that teams might be broken up and individual or new teams formed due to dysfunction at the discretion of the instructor. I understand the CHEN-4530 class Honor Code as stipulated herein and understand the ramifications for breaking the code.

_____ Signed

_____ Printed Name