

ChE 4020: Chemical Engineering Internship

Course Syllabus: AY 22/23 & 23/24

Course: Che 4020: Internship

Instructor: Dr. Jeremy Marston

Office: Chemical Engineering 209

Phone: 806-834-7012

Email: jeremy.marston@ttu.edu

Office Hours: By appointment only

Location: Dependent on internship

Hours: As agreed with instructor

Official Course description:

Individual studies in chemical engineering through an industrial work experience.

Other Course description:

Work experience in an industrial environment in order to gain knowledge and skills to apply to remaining engineering courses for undergraduate programs in chemical engineering.

Your internship must be with a company whose focus is engineering (preferably chemical). Otherwise, you will not be eligible to receive credit towards your CHE degree. To enroll, you must provide a job description (with job title) clearly outlining your role and the nature of the company.

Prerequisites & Required Training:

If the work is laboratory based/hands-on field work, students must complete the mandatory Texas Tech Environmental Health and Safety training for working in laboratories: (i) Laboratory Safety and (ii) Safety Awareness. **Please attach the certificates of completion to your Report.**

Course Goals:

This course is designed to enhance the undergraduate experience by providing the opportunity to engage in an industrial setting, learn new practical skills and/or research and design methodology.

Credit Hours:

Credits are assigned when students enroll, with the number of credits agreed upon with the instructor.

Safety:

All students must complete the minimum lab safety training mandated by TTU. In addition, training specific to the laboratory where the work is to be performed may be required. Students should adhere to the most comprehensive and rigorous safety policy between TTU and their industrial sponsor.

Learning outcomes, assessment and grading:

Students who complete this course are expected to be able to apply engineering principles in their projects and document this application by means of a **written report**. In particular, ABET has provided 7 criteria that engineers should master during their undergraduate career. Since there is wide variability in the type of assignment that the student might encounter in an internship, there are no specified/fixed outcome requirements. Therefore, to assess this course the student should **pick at least 2 of the ABET 1-7 criterion** that they think were addressed well by their assignment and address those in their report. Most likely, you will be able to report on Outcomes 2, 4, 5, 6, and 7, while the grading of the report will naturally assess outcome 3. The ABET 1-7 criterion are defined as follows:

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
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Students will be assigned a grade by the instructor at the end of the semester. The grade will be based on the report of their work experience in which the student discusses which of the outcomes (1-7) they think their internship best addressed, and a description of the work and activities that support their selection

Report content:

Whilst the precise format, section headings, and length of the report are left to the student's discretion, it must be at least 6 pages, and contain the following elements:

1. **Introduction:** [**~2 pages**] A general background of the business and technology of the industry or process with which they were involved. Business details might include general supply-demand discussion, production data, players and companies involved in the industry or using the process, the end use of the product or process.
2. **Role description:** [**~1 page**] A description of your role whilst working at the company, and a list of specific tasks/duties assigned.
3. **Technical details:** [**>3 pages**] A comprehensive discussion that illustrates how engineering and science-based analysis guided your decisions or recommendations. The report must include a *non-trivial amount of data* (real or simulated to avoid disclosure issues), detailed data analysis, properly referenced background on the

- data analysis, detailed graphs, schematics and other appropriate graphical presentations supporting your work and the decisions or recommendations that you made and should include estimates of error and statistical analysis. The report must discuss each figure or table, walking the reader through its significance. All estimates should be justified from scientific or knowledge-based reasoning. Technical details might include typical raw materials, generic processing steps, purification, safety, hazards, and end products or processes. For service work the report should describe the type of service provided, methods and techniques used by the service, rules, standards and regulations typical for the service and the end goal of the service.
4. **Learning Outcomes:** [**~1 page**] A clear and concise description of how the work performed relates to at least two of the ABET criterion above, and how these outcomes were attained through your work.
 5. **Conclusion/ Summary:** [**~1 page**] of what was learned during the internship and a statement of how the work performed will impact your future studies.
 6. **References / Appendices:** [**As needed**] List any cited literature and/or other sources of information used. If there are extensive tables of data or schematics (e.g., P&ID's) add them as an appendix.

Other Information:

Graphics should be professional, presentation quality. Text should be error-free, jargon-free and use proper scientific grammatical construction.

It should be noted that the student may work with confidential information and the contents of their work report should be vetted by their supervisor or legal department of their sponsor prior to submission, to ensure no improper disclosures are made. Students who are unsure what information can and should be discussed should ask their internship sponsor or their supervisor.

If because of secrecy or disclosure issues you cannot discuss what you actually did, pick similar technical content from the company that is public and discuss that. You may need to be creative, but you can let your work experience guide your technical discussion without revealing proprietary details.

Report Grading:

Your report will be graded based upon the following 4 sections (equally weighted – see rubric):

- Formatting and aesthetics
- Technical details
- Use of graphics
- Addressing the chosen ABET criterion

A: >90%, B: 81-90%, C: 71-80%, D: 61-70%, F: <60%

Report due date and submission:

In order to receive credit you must submit the following documents:

1. Technical report as detailed above
2. TTU safety certificates
3. Student survey of the internship experience
4. Site supervisor survey of the student performance

In order to facilitate timely grading, reports, certificates and student surveys are to be submitted via Blackboard by the official end of the semester, as per TTU's academic calendar. A late submission will result in a F-grade or simply no credit assigned for the course. The site supervisor survey can be submitted by email to the instructor of record.