

ChemE 612 Project Description

Reactor Concept design

The purpose of this project is to give you a taste of nuclear reactor design. Though there is insufficient time and resources to provide a complete conceptual reactor design, you will develop a working concept that meets the basic requirements for a nuclear reactor system. Each group will be responsible for submitting a group design report detailing the groups work for operational and transient conditions. Additionally, each group will produce a concept design document, which will detail the specifics of the reactor concept. Both a written report and an oral presentation will be given for the reactor concept. The reactor concept that you will be designing, based upon our discussions throughout the semester.

There will be three deliverables for this project:

- 1) An oral class presentation
 - a. Each group will present the work of their group in a class presentation, 25 minutes long (20 minutes of presentation, 5 minutes for questions). These presentations will take place on April 15th during class.
 - b. This presentation should summarize your group research paper. You will be communicating not only the design, but assumptions, calculations, challenges, and solutions.
- 2) Each group will prepare a detailed group paper. This will be a large (on the order of 20 pages) paper that describes the work completed by the group on the design. This report will be due by 12:00 PM on April 15th. It should include the following:
 - a. The specific design or designs of your components. This includes components, systems, structure, state points, constraints, and if necessary, and technical specifications or operational constraints.
 - b. Equations, correlations, assumptions (with justifications) and calculations used in the design.
 - c. Weaknesses or questionable assumptions, their justification for use, and a description of how this could be ameliorated with future work.
 - d. Transient performance of your system, and how the boundaries affect the other groups
- 3) Each Group will submit a "design document". This report will be due by 12:00 PM on April 15th. This document will be a single report (on the order of 5 pages) that details the overall concept of the reactor which includes key parameters drawings and design features. The main focus of this report should including the following points:
 - a. State points and operational parameters
 - b. Actual design concept (figures are helpful here!)
 - c. Transient behavior and margin to operational and transient limits
 - d. Constraints on operation and performance, including cost considerations (not a full economic analysis... just some thoughts on cost... expensive components, limiting prices and magnitude, ways to reduce cost potentially, etc. etc. etc.)