

Final Exam Project

ChEn 598R/698R – Statistical Thermodynamics

Overview

The project will serve as both the culminating learning experience in our class and as your final assessment. For the project, you will pick a topic in statistical thermodynamics *that we did not cover* in the course and create a 10- to 15-minute lecture on that topic.

You will be expected to present your lecture to the class during our final exam period. In addition, you will submit a well-written version of your lecture notes and accompanying supplemental material. I have provided some suggestions of lecture topics that you may use, but you are also free to choose one tailored to your specific interests. Be creative and have fun but remember that your time is limited. Be careful to limit your scope and choose a topic that is within your capabilities given the time allotted.

For all students (both 500- and 600-level), the project deliverables include:

1. A 1-page project proposal due on **Mon., Nov. 24th**.
2. A 10- to 15-minute oral presentation to be given during our regularly scheduled final on **Tue., Dec. 16th**.
3. Lecture notes and supplemental material, due by the time of the oral presentation on **Tue., Dec. 16th**.

For students in the 600-level version of the class, they will also need to submit:

4. A literature review (max 6 pages, double-spaced) that critically analyzes and synthesizes five primary research articles on the topic of their choice on **Tue., Dec 16th**.

The project grades will be based on the rubrics given below.

Note about Academic Honesty

This project is a type of exam, not a homework assignment. However, it is not a typical “take-home exam.” You are highly encouraged to use the internet, textbooks, the TA, and the instructor for help. However, it is meant to represent your own effort, not that of someone else. As such, you should not work together with your classmates on your project. There are obviously some gray areas here, so I expect you to use your best judgment. I don’t anticipate any academic dishonesty, but if there is, I will use the “[I know it when I see it](#)” standard. Please do your best work!

Description of Deliverables

Project Proposal (differences for 500-level and 600-level students where noted)

The project proposal is meant to help you decide the topic for your lecture and to receive feedback and approval from me. The proposal should fit on one page (single-spaced), and should contain the following:

1) *Project Scope*

- a) Identify the topic you are going to lecture on.
- b) Identify the primary reference material (e.g. papers, books, etc.) that you will use.
 - i) 500-level students should primarily rely on books or monographs. You should have at least one authoritative reference (e.g., a book by a reputable publisher) and not just online lecture notes or Wikipedia (though the latter are welcome additions).
 - ii) 600-level students should identify the five research articles they will review, as well as other useful references such as books and notes.

2) *Lecture outline*

- a) Provide a preliminary lecture outline that identifies the principle(s) you will cover, what equations you will derive, what examples you will give, etc.

3) *Project Justification*

- a) Explain why this topic is important/interesting to you and to the wider scientific/chemical engineering community.
- b) Justify why this problem is an example of statistical thermodynamics that is appropriate for our course.

Project Proposal Rubric (75 pts)

Proposal Element	Points
Project Scope	20
Lecture Outline	20
Project Justification	20
Approval to proceed	15
Formatting (1 page) and grammar	Penalties as needed

Lecture Presentation

The objective of your project is to teach us something new. As such, the audience for your lecture is the class. When preparing, assume a level of expertise typical of your classmates. I will be far more impressed (and more likely to give a high score) to a student who teaches us clearly, rather than someone who tries to impress us with complicated details.

Your lecture should contain the following elements.

1. Introduction to the topic and a brief justification of its importance
2. Explanation of key concepts or ideas
3. Derivation of foundational equations
4. Examples or classic solution of foundational equation
5. Conclusion that ties together key concepts and importance

Oral presentations will be scheduled in our classroom during the time allotted by the University for our final exam in 15-minute slots. Remember that a lecture often has questions and should be interactive in some way, so please plan your time accordingly. You are expected to attend all of the presentations by your classmates.

Lecture Presentation Rubric (150 pts)

Proposal Element	Points
<u>Quality:</u> Degree of difficulty, relevance to the course, appropriately rigorous methods	50
<u>Execution:</u> Lecture is complete, concepts and equations are correct, clear demonstration of understanding.	50
<u>Communication:</u> Oral presentation is clear and engaging. We learn something.	25
<u>Documentation:</u> Lecture notes are readable, accurate, and logically organized. Sources are cited. Supplemental material and/or appendices are readable and helpful.	25

Literature Review (600-level students only)

Students enrolled in the 600-level section will complete all of the previous assessments as students in the 500-level section. In addition, they will prepare a literature review (6-page limit, double-spaced) on their final project topic. The review must critically analyze and synthesize at least five primary research articles (beyond textbooks or standard references). The purpose of this requirement is to provide deeper engagement with the current research

literature and to place the chosen topic in the broader context of ongoing developments in statistical thermodynamics.

Your review should contain the following elements:

- An introduction that identifies the topic and explains its importance.
- A background reviewing foundational concepts that the literature is based on.
- A discussion that critically analyzes the articles.
- A conclusion that synthesizes the articles to assess the current state of research on the topic.

Literature Review Rubric (50 pts)

Proposal Element	Points
<u>Writing:</u> The review is properly organized, it is well-written, and it contains appropriate sources. Paragraphs are logically constructed. The length is appropriate and there are no typos.	25
<u>Understanding and analysis:</u> The review demonstrates clear understanding and teaches us something. The review critically analyzes the topic by comparing the objectives, methods, and/or results of the different articles. The discussion synthesizes the contributions of the literature to describe the current state of the field.	25