NPRE 397 Fall 2016
Design Considerations for Accident Tolerant Fuels Due 2016.12.16

For NPRE 397, your total grade will be earned through a comprehensive design project. It is intended to tie together your nuclear engineering knowledge with your engineering design expertise through an independent analysis of design considerations for accident tolerant fuels. The project will be assessed as independent design and research work, much like a journal article undergoes peer review. I will be looking for :

- Novelty and Creativity
- Technical Detail
- Analytic Rigor
- Verifiability
- Clarity
- A Conclusion

This work will consist of two deliverables, a proposal and a final report.

1. (10 points) **Proposal: Due 2016.10.12**

   To help determine of reasonable scope, the first step of the project will be a proposal outlining the modeling methods and approach for modeling reactivity response of fuel that could improve accident tolerance in future reactor designs. The focus is to determine the tolerance of fuels during reactor accidents and the ability to inhibit an unconstrained temperature increase. This will be assessed by calculating the reactivity feedback coefficients of fuel with different parameters. Simulations will be done using Monte Carlo methods. At least one type of fuel type will be characterized, but others may be investigated as well.

   Once you submit this proposal, I will respond with feedback. Much like a conference abstract, the proposal should meet the following guidelines:

   - Minimum 500 words.
   - Maximum 1000 words.
   - Two columns.
   - Reasonable margins.
   - 10 pt font or larger.
   - State the question you plan to answer.
   - Summarize the current state of the art in the literature.
   - Motivate the problem, explaining its relevance.
   - Describe the approach and methods you will take to answer the question.
   - Propose an outline of the analysis, software, data, and/or conclusions that will be delivered.

2. (90 points) **Final Report: Due 2016.12.16**

   A final report detailing the findings of the simulations will be presented at the end of the semester. The report will outline the parameters varied and the resulting reactivity changes. The report will contain the description of the methods used and proposed follow up work. Prepare the final document in the style of a journal article or conference proceedings. It should meet the following guidelines:

   - Minimum 3000 words.
   - Maximum 10000 words.
   - Two columns.

- Reasonable margins.
- 10 pt font or larger.
- State the question you answered.
- Comprehensively report and cite the current state of the art in the literature.
- Motivate the problem, explaining its relevance.
- Describe the approach, methods, and other elements of your design recommendations.
- Describe in detail: the analysis, software, data, conclusions produced in this work.
- Include publication quality graphs and figures.
- Cite and provide data and code generated for this work sufficient to reproduce the conclusions.
- Compare this result to previous results in the literature, reinforce the relevance of the work.
- Suggest future work.