

Clemens, Kristin A [M E]

From: Jane Doe <test490@iastate.edu>
Sent: Thursday, December 22, 2016 8:51 AM
To: Clemens, Kristin A [M E]
Subject: ME 490 Request from Jane Doe

Name

Jane Doe

Student ID

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Advisor

John Wagner

Problem Supervisor

Name	Email Address
Cris Schwartz	cris1@iastate.edu

Please choose the course and topic that best represents your Independent Study. Election of course and topic must be approved in advance by supervising faculty.

ME 490Q Materials Processing and Mechanics

Year of Enrollment

2016

Term of Enrollment

Fall

Requested Number of Course Credits

3

Will you be working in a lab?

Yes

Have you completed the necessary safety training?

Yes

Course Objectives and Methods of Evaluation

Please list any prior study/experience that has prepared you for the independent study you are requesting.

Various engineering courses, such as Mechanics of Material and Manufacturing, allowed me to have interests in mechanical properties and processing. Also, I always enjoyed mathematics which helped me to appreciate the theoretical approach to the material reliability analysis in the many research papers. Moreover, I enjoyed taking the engineering statistics course and I

would like to have a chance to incorporate the knowledge I learned to the research to understand better how statistics is used in real engineering application.

What will you learn from this experience that would be useful in other applications outside of the 490 project? Please list specific outcomes.

1. I will learn various mathematical methods of analyzing mechanical properties of material and reliability analysis such as polynomial chaos expansion or probability estimation method.
2. I will learn how to use Matlab and develop advanced Matlab techniques and understandings.
3. I will learn how Matlab coding can be incorporated through research of reliability analysis to get research results.
4. I will learn how the research paper is formatted and written.
5. I will learn how to deal with uncertainty in mechanics of materials.
6. I will learn and review information about the governing physics behind mechanics of materials.

What will you do specifically as part of the 490 experience? Please summarize the project and describe the steps, skills and research involved.

I will be reading research papers about methods of uncertainty quantification and reliability analysis. I will study numerical models (e.g., polynomial chaos expansion and stochastic collocation) for uncertainty quantification and reliability analysis. I will try to come up with some meaningful idea around efficient and accurate uncertainty quantification and reliability analysis for high-dimensional engineering systems, and produce important research results that can be written into an individual report.

How will you communicate with your supervisor throughout the term? How often? How will you show that you have succeeded in meeting the objectives you have identified?

- I will be attending a weekly general team meeting on every Monday. Aside from that, I will also be having a 30 minutes-long 1-on-1 meeting with my supervisor on every other Thursday. For this meeting, I will be required to prepare 3-4 PowerPoint slides that summarizes the progress on my independent study. We will be sharing the data using online data storage, Dropbox.

- The following summarizes two end-of-semester deliverables of this independent study:

Written Summary Report: I will study the assigned and other relevant literature on reliability analysis and uncertainty quantification, in order to be able to (i) develop a research idea around efficient and accurate uncertainty quantification and reliability analysis for engineering systems with high dimensions, and (ii) outline a research plan for implementing such an idea. I will summarize the results of this study in a one page (single-spaced, 12-point font size, and one-inch margins) report with the following three paragraphs:

Paragraph 1: Summarize the relevant literature on reliability analysis and uncertainty quantification.

Paragraph 2: Identify a technical challenge associated with efficient and accurate uncertainty quantification and reliability analysis for high-dimensional engineering systems, and describe an idea, worthy of continued research, to resolve the issue.

Paragraph 3: Describe a research plan, laying out numerical, and/or analytical activities, to implement and validate the research idea.

Oral Presentation: I will prepare a 30 min presentation (with PowerPoint slides) describing my literature review, proposed idea and research plan. Per an earlier discussion with my instructor, the oral presentation will be treated as the final exam, which, in combination with the written summary report, will be used to determine my final grade.

By typing your name in the box below and clicking "Submit" you are digitally signing this form and asserting that the above information is accurate and that you are the requestor of the proposed ME 490 Independent Study for the year and term stated above.

Jane Doe