INME 4707
Gas Turbine Thermodynamics and Propulsion

Course Project Description

Dr. Sheilla Torres-Nieves
Spring 2018

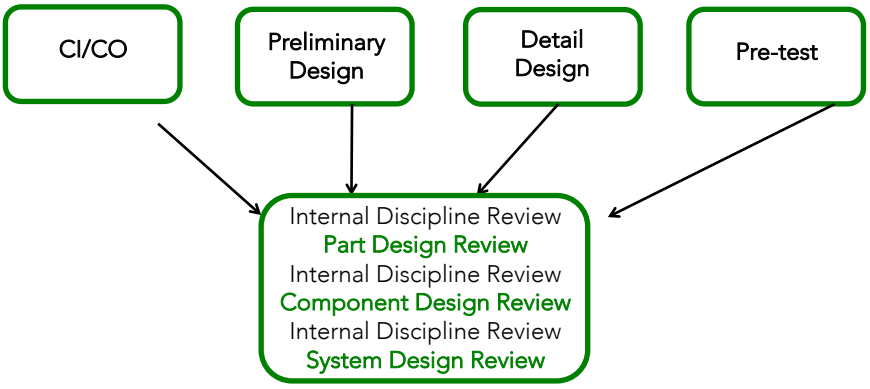
Important Announcements

- Exam 1: Monday, March 26 (during class time)

Course Project: Overview

- Total: 100 points (20% of course grade)
  - Oral Presentation: 40%
  - Written Documentation: 30%
  - Team/Professor meeting & Mid-term deliverables: 20%
  - Research Effort: 10%
- Team effort: 3 team members
- Written report and oral presentation must be done in English
- Required team meeting ('Internal Design Review') with Professor to be scheduled for week of April 16, 2018 (10%)
- Due date for mid-term reports and presentations: Monday, April 23, 2018 at 9:30:00AM.
- Due date for final reports and presentations: Wednesday, May 16, 2018 at 9:30:00AM.
  - NOTE: Late reports/presentations will receive a grade of F.

Product Development: Design Approval Process



Course Project: Objectives

1. Gain deeper knowledge on the performance of gas turbine engines by better understanding the interplay between the design parameters that determine key engine characteristics.
2. Learn how to interrogate the design space (a.k.a. flight envelope) of an aircraft engine.
3. Relate previously published work, in peer-reviewed journals, with the material learned in class.
4. Polish coding and design automation skills.
5. Understand the importance of disseminating research findings in written and oral forms.
   - Develop and polish presentation/oral communication skills.

Course Project: Description

1. Develop an analytical model that describes the impact of changes in component characterization on the overall performance (i.e., efficiency, thrust, etc) of a turbojet engine.
   - All equations, assumptions, and reasoning behind model must be explained
   - You select the turbojet engine to analyze. First come, first serve!
2. Automate/code your model (using MATLAB, Maple, MathCad, Excel, Python, Fortran, C++, etc.)
   * A copy of the code, properly commented for documentation purposes, must be included in the report
3. Define a matrix of conditions (e.g. flight conditions, atmospheric conditions, etc) to validate your model and survey the design space.
   - **Minimum of 4 conditions per team member to be tested** (total of 12 conditions per team)
   * Correlate conditions to be tested with real situations
4. Select the combination of parameters that results in the optimum solution.
   * Justify your answer.

Course Project: Resources

- Course textbook and additional books/resources used in class
- Peer-reviewed publications
  - Electronic search
  - UPRM Library Online Journals: http://www.uprm.edu/library/
    - Recursos → Revistas Electrónicas
  - Examples of Journals of relevance:
    - Aerospace Research Central (AIAA Journal, Journal of Propulsion and Power, Journal of Jet Propulsion)
    - Journal of Turbomachinery
    - Journal of Engineering for Gas Turbines and Power
    - Propulsion and Power Research
    - Turbomachinery Performance Analysis
    - Turbomachinery: Design and Theory
    - Turbomachinery International Magazine
    - Applied Thermal Engineering
  - Interlibrary Loans Services at UPRM (1-2 weeks to get articles; pay for copies): http://www.uprm.edu/library/
    - Servicio → Préstamo Interbibliotecario
  - Sci-Hub
- Class notes

Course Project: Written Report (30%)

- Use AIAA Paper Template: not to exceed 10 pages!!!!
  - https://www.aiaa.org/techpresenterresources/
  - Already Been Accepted to a Conference? → AIAA Paper Template (Word)
- Report must contain the following sections:
  1. Project Summary
  2. Introduction
     - Problem Statement
     - Background Information / Literature Review
  3. Methodology
     - Model description
  4. Results and Observations
     - Must include strengths and limitations of model
  5. Conclusions
  6. Appendix
     - Model: Code documentation
     - Group meeting dates, attendance and brief summary
     - Short biosketch of team members
     - Evaluations (self-evaluation and assessment by team members)
  7. Acknowledgements
  8. References
- Rubric
  - http://engineering.uprm.edu/inme/wp-content/uploads/2014/02/Written-Communication-Assessment-g.xlsx

Course Project: Oral Presentations (40%)

- **Timed** presentation (8 minutes per group):
  - 6 mins for presentation
  - 2 mins for questions
- Intent of presentation is to orally disseminate the work and findings presented in your written report.
  - Must summarize all information required for written report
- All team members must have an active part during the presentation
- Measured based on:
  - Organization and effective use of time (20%)
  - Content depth (30%)
  - Use of verbal and non-verbal language: Grammar, Body Language, Tone (20%)
  - Audience interaction & Professionalism: Questions and Answers (30%)
- **Practice the presentation several times and time yourself.**
- **PRACTICE, PRACTICE, PRACTICE!** ☺
- Rubric
  - http://engineering.uprm.edu/inme/wp-content/uploads/2014/02/Oral-Communication-Assessment-g.xlsx

Course Project: Research Effort and Professionalism (10%)

- Group effort?
- Individual and group contributions considered in grade ("weighted grade")
- Participation/attendance to group meetings
  - Keep attendance roster
  - Keep minutes of meetings
  - Required to be included in report as Appendix
- Team members assessments: self-evaluation and assessment by team members
- (Forms to be provided by Professor)
- Rubric
  - http://engineering.uprm.edu/inme/wp-content/uploads/2014/02/Data-Analysis-Experimental-Design-Assessment-a-b.xlsx

Course Project: 'Internal Design Review' Meeting and Midterm Deliverables (20%)

- **Internal Design Review Meeting** (10 minutes per group):
  - Week of April 16
    - Professor will send out calendar with available time slots
    - Need to email Professor to schedule meeting by March 23
  - Discuss progress of project
  - Show preliminary results
  - Share preliminary mid-term slides and report
  - Identify potential issues, questions, doubts and answer these

Course Project: 'Internal Design Review' Meeting and Midterm Deliverables (20%)

- **Midterm Deliverables**
  - Due by Monday, April 23 at 9:30:00AM
  - Draft of Presentation (sections required for written report must be included)
  - Written Report: Section due on April 23

1. Project Summary
2. Introduction
   - Problem Statement
   - Background Information / Literature Review
3. Methodology
   - Model description
4. Results and Observations
   - Must include strengths and limitations of model
5. Conclusions
6. Appendix
   - Model: Code documentation
   - Group meeting dates, attendance and brief summary
   - Short biosketch of team members
   - Evaluations (self-evaluation and assessment by team members)
7. Acknowledgements
8. References

Course Project: Peer Evaluation

INME 4707 Gas Turbine Thermodynamics and Propulsion
Peer Evaluation of Teamwork Effort

This peer evaluation sheet is intended to assist your partners in honoring their skills as team members.

Peer Teamwork Review For: _____ **Date:** _____

Peer Review Completed By: _____ **Overall Score:** _____

CATEGORY	3 - Excellent	2 - Good Job	1 - Needs Work	0 - Unsatisfactory	Score
Quality of Work	Work could be used by instructor as a model for other students.	Work is of high quality but may require minor improvements.	Team may need to repeat some parts of the individual's efforts.	Work could not be used by team.	
Quantity of Work	Member does considerable extra work.	Member completes his/her share of the work.	Member does not complete his/her share of the work.	Member falls behind in work effort.	
Creativity	Contributes numerous ideas to project	Contributes several ideas	Makes some suggestions to the group	Never contributes ideas.	
Reliability	Always follows through on commitments, attends and is on time for group meetings.	Follows through on commitments, and may occasionally be late for a group meeting	Completes tasks if constantly reminded; may occasionally be late or miss a group meeting	Cannot be counted on	
Teamwork	Acts as a leader when appropriate; encourages others to speak; listens respectfully to opinions of others; engages in constructive discussion	Encourages others to speak; listens respectfully to opinions of others; engages in constructive discussion	May tend to sit back and let others take control OR may tend to "take over" or be unnecessarily argumentative	Fails to contribute OR is rude or disrespectful of others	
Overall Evaluation	I would go out of my way to work with this individual again	I would be pleased to work with this individual again	I would not mind working with this individual again	I would rather not work with this individual again	

What percent of the work **not done by you** did this individual complete? _____

Additional Comments:

Course Project: Meeting Minutes

INME 4707 Team 1: Group Meeting 1 | MINUTES

Meeting date | time *Date* | *Time* | Meeting location *Location*

Meeting called by	Name	Attendees
Type of meeting	Purpose	Attendees
Facilitator	Name	
Note taker	Name	
Timekeeper	Name	

AGENDA TOPICS

Time allotted | *Time* | Agenda topic *Topic* | Presenter *Name*

Discussion Conversation

Conclusion Closing

Action items	Person responsible	Deadline
Topic 1	Presenter Name	Date	time
Topic 2	Presenter Name	Date	time

Time allotted | *Time* | Agenda topic *Topic* | Presenter *Name*

Discussion Conversation

Conclusion Closing

Action items	Person responsible	Deadline
Topic 1	Presenter Name	Date	time
Topic 2	Presenter Name	Date	time

Summary: Important Dates

Milestone	Deadline
Email Scheduling Internal Design Review & Engine Selection	Friday, March 23 at 12:00:00 PM
Internal Design Review	week of April 16
Mid-term reports and Presentations	Monday, April 23 (9:30:00AM)
Final Reports and Presentations	Wednesday, May 16 (9:30:00 AM)

All presentations and reports must be uploaded to the Google Drive shared folder on or before the specified deadline.

Teams

- Team 1: Edwin Aponte/ Christian Lagares/ Joel Quijano
- Team 2: Jorge Lopez / Alexis Oquendo / Roberto Lamoso
- Team 3: Jorge Meléndez / Axel Díaz / Keyshlan Aybar
- Team 4: Aneudy Cruz / Vincent Bigio / Carlos Colón
- Team 5: Adrián Rodríguez / Brenda Rivera / René Quiñones
- Team 6: Samir Candelaria / Héctor Ortiz / Winger Almodóvar
- Team 7: Christian Adrover / Roberto López / Jerome Seguinot
- Team 8: Astro Muñoz / Leonardo Castro / Arnaldo Santiago
- Team 9: Niomarie Gonzalez / Paola Nieves / Felix Torres
- Team 10: Earvin Chaparro / Andre Pagán / Roland Berrios
- Team 11: Ronald Alvarez / Abigail Cruz / Ivan Febus
- Team 12: Antonio Marrero / Luis Rosado / Javier Tavarez