Progress Reports are graded on the (i) write-up of what has been accomplished and (ii) the amount of said progress on the overall project.
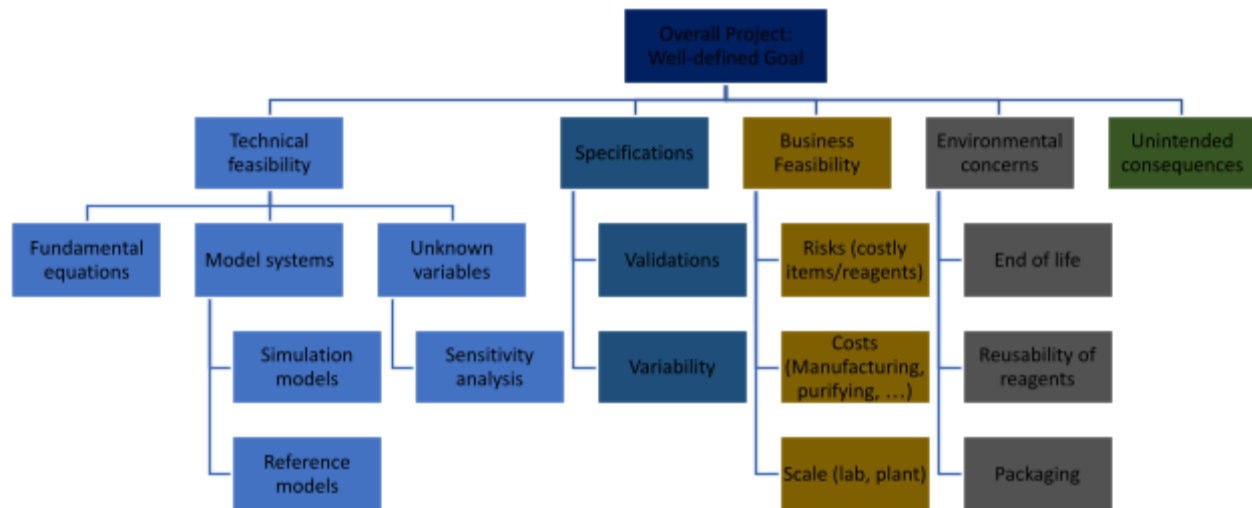
1. Group Number and Title: Group 11 – Sustainable Polymers

2. Week 7/16 and Date: 3/7/2025

Understand	Synthesize	Ideate	Prototype	Implement
Explore	Debrief	Brainstorm	Create	Support
Observe	Organize	Propose	Engage	Sustain
Empathize	Define	Plan	Evaluate	Evolve
Reflect	Interpret	Narrow Concepts	Iterate	Execute

3. Provide a brief list of activities that were done and their corresponding HCD space(s) and subspace(s) (add rows if necessary):

Activity	HCD space(s)	HCD subspace(s)
Continuing Degradation Tests	Prototype	Evaluate
Continuing working on Midterm Presentation: background research on fundamental equations	Understand and Synthesize	Explore and Organize/Define
Continuing DSC data collection	Prototype	Evaluate
Fabricated first fiber prototype with PLA/PEG blend	Prototype	Create
Continuing preparing for mechanical testing	Plan	Propose, Brainstorm
Looking for methods to hot pull fibers more consistently	Plan	Brainstorm

4. What branches/blocks were work focused on this week?

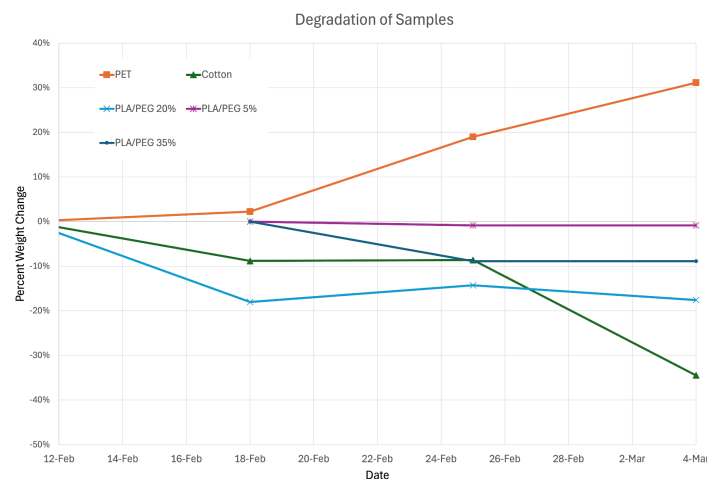Technical feasibility - model systems (reference models)
Specifications - validations and variability
Environmental concerns - end of life
Business feasibility - scale

5. What was accomplished? (4-5 bullet points, include data/charts if applicable)

- First successful fiber prototype was made from 20 wt% PEG + PLA
- Confirmed with Professor Sottos to use their Ingstron!
- Almost finished draft of Midterm Presentation
- Finished first round of DSC collection
- Now have 4 data points for degradation testing

6. What challenges are still outstanding? (2-5 bullet points)

    - Still have to finalize mechanical testing set up for the fibers.
    - Still need to find a more controlled manner to pull fibers and determine if it makes consistent sizes.
    - Still need to determine how to make polymer/natural fiber composites.
    - The cotton degradation sample is falling apart, which could result in the premature termination of the cotton degradation test.

7. As you engaged in human-centered engineering design activities this week, do you think you became curious about any new content? If yes, how?

    We became more curious about how we can validate our degradation results through characterization of the degraded samples (ex. do DSC or GPC).

8. As you engaged in human-centered engineering design activities this week, do you think you made any new connections (e.g. connections between ideas, connections between people, etc.)? If yes, how?

    We found new literature about mechanical testing and degradation as part of our background research for the fundamental equations section. This information gives us a better idea how to go about our mechanical testing and what quantities we can calculate from those results. We also realized that doing the same characterization tests on our samples after degradation can show what changed during degradation.

9. As you engaged in human-centered engineering design activities this week, do you think you created any value (e.g. identified a way to work together more efficiently, found a way to improve your idea or design, etc.)? If yes, how?

    We were able to successfully make a prototype, which we were not able to before. We also confirmed that all of our blends (except the 5 wt% PEG) are biodegradable. This satisfies one of the base conditions for our design.

10. What feedback did you obtain from the instructor or TA last week that you addressed in your work this week?

    TA wondered if the clusters in SEM were due to the heterogeneity of PEG and PLA.
    The literature SEM image below on the right shows the result of the PLA/PE blend, which is commonly known as immiscible. Comparing this SEM image to ours (on the left), it is most likely that the clusters on our samples are surface porosities and not phase separations.