**PROBLEM STATEMENT:**
A lack of on-campus internship opportunities for Biological Engineers, coupled with the absence of a student run production facility.

**OBJECTIVES:**
1. Design a student-run creamery that allows for internship opportunities and departmental research.
2. Provide homemade ice cream products using locally sourced ingredients.
3. Restoration of the previously successful Purdue creamery.
4. Flexibility in production as demand changes.

**PROJECT BACKGROUND:**
• 15+ university creameries exist (5 are BIG 10!)
• Purdue’s original creamery operational 1913–1969

**MARKETING AND CONSUMPTION:**
• Purdue market includes 15,000 students

**ICE CREAM INGREDIENT FUNCTIONALITY:**
Dairy: Milk, Cream, Nonfat solids (NFS)
• Fat: Provides creaminess and richness of ice cream
• NFS: Stabilizes air and influences body and texture
Sweeteners: Sugar, Corn Syrup, Sucralose
• Lowers freezing point of mix, allowing fraction of water to remain unfrozen
• Allows product to be scooped and eaten more easily
Emulsifiers: Egg yolk, Mono- and Diglycerides
• Keep the fat evenly dispersed in the product during freezing and storage
• Smooth product achieved from even fat distribution, stabilize the air incorporated

**PROCESS BREAKDOWN:**
- **Holding Tank:** Raw milk sourced from Purdue dairy farms will be held at 37°F.
- **Pasteurizer #1:** Raw milk will pass through to ensure killing of microorganisms.
- **Homogenizer #1:** Milk passes through to ensure stability of final emulsion, by decreasing globule size.
- **Agitated Holding Tank:** Stores milk at 37°F.
- **Cream Holding Tank:** Stores externally sourced cream at 37°F.
- **Kettle with Agitation:** Ice cream mix ingredients are brought together and heated to kill microorganisms.
- **Heat Exchanger:** Cools mix down to storage temperature of 40°F.
- **Homogenizer #2:** Final ice cream mix is homogenized to ensure acceptable texture of final product and stability during aging.
- **Aging Tanks:** Emulsifiers adsorb onto fat droplets and flavor develops.
- **Continuous Ice Cream Freezer:** Converts ice cream mix to a semi-frozen product.
- **Ingredient Feeder:** Allows addition of solid ingredients to specialized ice cream flavors.
- **Ice Cream Tub Filler:** Dispenses semi-frozen product into 3 gallon and quart containers for sale.
- **Hardening Freezer:** Allows final freezing of ice cream and safe storage

**ECONOMIC ANALYSIS**

**PROCESSING ALTERNATIVES:**
• Making cream from raw milk
• Using traditional pasteurization method
• Combined pasteurizer and homogenizer system
• Shorter aging time

**FORMULATION ALTERNATIVES:**
• Simple Mix: good flavor, slightly grainy
• Custard Mix: thick, intense egg flavor, good mouthfeel
• Cornstarch Mix: off taste, left coating in frozen product

**SUSTAINABILITY:**
• Environmentally, little to no waste in production
• Economically, self-sustaining and profitable

**GLOBAL/SOCIAL IMPACT:**
• Increase student opportunities and University funds
• Support of the Purdue dairy and local suppliers
• Interest by Purdue alumni in the reappearance of the Purdue creamery