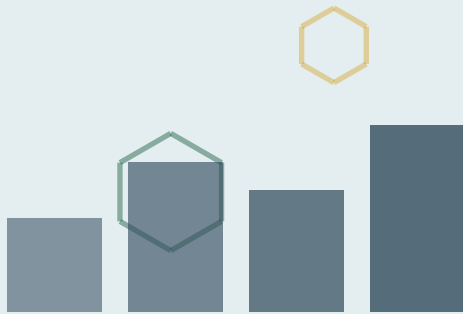


COLLEGE & UNIVERSITY • UNDERGRAD & GRAD • AGES 19–28

Leading the Transition to a Plastic-Free World

Full Curriculum Module

A four-unit, research-grade curriculum for undergraduate and graduate students in environmental science, business, engineering, and public policy — covering biopolymer science, circular economy frameworks, ESG strategy, and sustainability entrepreneurship.

UNITS IN THIS MODULE

- 1 Unit 1: Advanced Bioplastics & Material Innovation
- 2 Unit 2: Circular Economy & Zero-Waste Frameworks
- 3 Unit 3: ESG Strategy & Corporate Sustainability Reporting
- 4 Unit 4: Innovation, Entrepreneurship & Impact Ventures

Unit 1: Advanced Bioplastics & Material Innovation

Graduate-level exploration of biopolymer science: feedstock sourcing, fermentation processes, mechanical property analysis, and end-of-life decomposition pathways. Includes comparative lifecycle analysis of PHA vs. petroleum polymers.

KEY CONCEPTS

- Feedstock sourcing and fermentation pathways for PHA production
- Mechanical property benchmarking against petroleum-based plastics
- Comparative lifecycle analysis methodology (cradle-to-grave)
- End-of-life decomposition across marine, soil, and industrial compost settings

SEMINAR PROMPT

Compare the total cradle-to-grave environmental footprint of a PHA-based product to its petroleum-based equivalent. What assumptions in a lifecycle analysis most heavily influence the outcome, and how would you defend those assumptions to a skeptical stakeholder?

Unit 2: Circular Economy & Zero-Waste Frameworks

Comprehensive study of circular economy principles applied to packaging — from product design for disassembly to closed-loop composting infrastructure. Examines real-world implementation at scale.

FRAMEWORK EXERCISE

1. Map the full lifecycle of a packaging product from raw material to disposal.
2. Identify each point where the loop could be closed (reuse, recycle, compost, redesign).
3. Evaluate the infrastructure gaps preventing a fully closed loop at scale.
4. Propose one design or policy intervention that would close the largest gap.

KEY TERMS

Closed-loop system

A production model where end-of-life materials are recovered and reintroduced as inputs.

Design for disassembly

Engineering products so components can be separated for reuse or recycling.

Extended Producer Responsibility

Policy requiring manufacturers to manage the end-of-life impact of their products.

Composting infrastructure

The municipal or industrial systems required to process compostable materials at scale.

Units 3 & 4

3

ESG Strategy & Corporate Sustainability Reporting

How businesses develop and communicate environmental, social, and governance (ESG) commitments. Covers sustainability reporting standards (GRI, TCFD, CDP), investor expectations, and measuring environmental impact.

4

Innovation, Entrepreneurship & Impact Ventures

Frameworks for building sustainability-focused businesses and social enterprises. Students explore funding models, go-to-market strategies, and how startups like Pure Form Solution are disrupting the \$1 trillion global packaging industry.

PAIRS WELL WITH

- ESG Reporting Guide (Unit 3 deep-dive)
- Case Study: Pure Form Solution's Product Innovation (Unit 4 application)

What Students Take Away

- Comprehensive understanding of the sustainable packaging industry landscape
- Skills in lifecycle analysis, ESG reporting, and impact measurement
- Exposure to professional networks and potential internship pathways
- Capstone project framework for applying learning to real-world proposals

NEXT STEPS FOR EDUCATORS

1. Pair this module with the Lifecycle Analysis Template for Unit 1
2. Assign the ESG Reporting Guide for Unit 3
3. Use the Case Study as a capstone application exercise for Unit 4

Questions? help@pureformsolution.com