

Module 2: Materials, Lifecycles, and Circular Design

Overview

This module focuses on the material life of design. Students examine how products, interiors, packaging, visual systems, and built environments move through stages of extraction, production, use, maintenance, repair, reuse, and disposal.

The central idea of this module is lifecycle thinking. Sustainable design is not about making something look eco-friendly. It requires designers to ask where materials come from, how they are processed, how long they last, whether they can be repaired, and what happens when they are no longer wanted.

Students also learn to question green claims. A design may be marketed as natural, recyclable, sustainable, ethical, biodegradable, low-impact, or circular, but these claims need to be examined critically.

Key SDG links: SDG 9, SDG 11, SDG 12, SDG 13, SDG 15

Learning Objectives

By the end of this module, students should be able to:

- Explain how material choices shape the sustainability of designed products and spaces.
- Apply lifecycle thinking to analyse a design's environmental impact.
- Identify the difference between meaningful sustainability claims and weak green claims.
- Propose a circular design improvement that reduces waste or extends value.

Required Academic Reading

McDonough, W., & Braungart, M. (2002). *Cradle to cradle: Remaking the way we make things*. North Point Press.

Required excerpt: Chapter 4, "Waste Equals Food," pp. 92–106.

Reading focus:

As you read, focus on the idea that waste is a design failure, not an unavoidable outcome. Pay attention to how McDonough and Braungart challenge linear "take–make–dispose" models and introduce circular thinking.

Pre-class Activity: Lifecycle Snapshot

Choose one designed product, package, garment, piece of furniture, interior material, or printed/digital design output.

Examples:

- plastic food packaging
- cardboard delivery packaging
- office chair
- fashion item
- bamboo product
- hotel amenity
- exhibition display
- poster or printed brochure
- coffee cup
- takeaway container
- interior wall panel
- flooring material
- reusable bag
- product packaging for cosmetics or food
- electronic accessory

Write **200–250 words** responding to the prompt:

Where does this design create impact across its lifecycle?

Include:

- what the design is
- what materials it uses
- how it is produced or distributed
- how long it is likely used
- what happens after use
- one idea from McDonough and Braungart
- one SDG connected to the issue

In-class Activity 1: Lifecycle Hotspot Map

Goal: Help students identify where environmental impact appears across a design's life.

Groups choose one design and map it across these stages:

- raw material extraction
- production or manufacturing
- packaging
- transport or distribution
- use

- maintenance or repair
- reuse
- recycling
- disposal

For each stage, students identify:

- One possible environmental impact
- whether the impact is visible or hidden
- who has power to reduce the impact
- which stage creates the biggest sustainability concern

Output: A simple Lifecycle Hotspot Map showing the most important impact point.

In-class Activity 2: Green Claim Check

Goal: Help students evaluate sustainability claims critically.

Students examine a design that is marketed as sustainable, eco-friendly, natural, green, ethical, recyclable, biodegradable, low-carbon, or circular.

They answer:

- What claim is being made?
- What evidence is provided?
- What evidence is missing?
- Is the claim about materials, production, use, disposal, labour, or all of these?
- Could the claim be misleading?
- What would make the claim stronger or more transparent?

Possible claims to examine:

- “made from recycled materials”
- “biodegradable packaging”
- “eco-friendly hotel amenities”
- “sustainable fashion”
- “natural bamboo product”
- “recyclable plastic”
- “green building material”
- “low-waste packaging”
- “carbon neutral product”
- “ethical handmade product”

Output: A short Green Claim Evaluation:

“The claim is _____. The strongest evidence is _____. The missing evidence is _____. We think the claim is strong / weak / unclear because _____.”

In-class Activity 3: Circular Design Improvement Sprint

Goal: Help students propose a circular design improvement that reduces waste or extends the value of a product, material, space, or system.

Working in groups, choose one design from your pre-class work. Your task is to propose **one circular design improvement**. The improvement should either:

- reduce waste
- extend product life
- make repair easier
- support reuse
- reduce unnecessary material use
- create a take-back or return system
- turn a single-use item into a multi-use system
- shift the design from ownership to sharing, refill, repair, or service

Your group should answer the following questions:

- What is the current design problem?
- Where does value get lost in the lifecycle?
- What circular improvement are you proposing?
- Does your improvement focus on material, product life, reuse, repair, recovery, service, or user behaviour?
- Who would need to participate for the improvement to work?
- What waste or resource use would be reduced?
- What new trade-off might appear?
- How would you know whether the improvement is successful?

Your proposal should avoid vague claims such as “make it recyclable” or “use sustainable materials.” You need to explain how the circular improvement would actually work in practice.

Output: Create a short Circular Design Improvement Proposal with the following structure:

1. **Current design:** What are you analysing?

2. **Lifecycle problem:** Where is waste created or value lost?
3. **Circular improvement:** What would you change?
4. **Circular strategy:** Is this about reuse, repair, refill, recovery, sharing, durability, or material reduction?
5. **Stakeholders:** Who needs to act?
6. **Sustainability benefit:** What waste, material, or resource issue is reduced?
7. **Trade-off:** What might become harder, more expensive, or less convenient?
8. **Success measure:** What would you monitor?

Example:

A hotel currently provides small single-use shampoo bottles. A circular design improvement could replace them with refillable wall-mounted dispensers, supported by supplier refill containers and cleaning protocols. This reduces plastic waste, but may require new maintenance routines, guest communication, and supplier coordination.

Post-class Reflection

Respond to the prompt:

“Why is sustainable design more than choosing an eco-friendly material?”

Include:

- one lifecycle stage you had not considered before
- one green claim you would now question more carefully
- one circular design improvement that seems realistic
- one trade-off designers must face