

biomaterials

for designers

A common definition of a biomaterial is a material that is derived from, or produced by, biological organisms like plants, animals, bacteria, fungi and other life forms. Just because a material is bio, doesn't necessarily make it sustainable. Wood, one of the most common biomaterials, can be sustainably produced, but will vary greatly depending on its type, how and where its grown and how its harvested. So we are not only interested in working with various biomaterials, but also understanding their provenance. We want to work with material(s) in ways that are not harmful, and even beneficial to the environment.

Two materials of interest in this course will be mycelium and hemp. Mycelium is the name given to the underground network of hyphae (single celled strands) that compose the living body of a fungi organism, the fruiting element of which is the mushroom. Think of an apple's relationship to an apple tree - the tree being analogous in form and purpose to mycelium, the apple being the mushroom (the fruiting body which delivers the seed (spore)). Fungi are often called the '3rd Kingdom.' This is because they don't conduct photosynthesis, like plants, to survive. They are actually more like mammals in that they excrete an enzyme, like our stomachs do, that causes decay in plant matter so they can feed on it. As they feed, the hyphae form a dense network of material that binds to any substrate creating a matter whose closest synthetic equivalent is expanded polystyrene or EPS foam, commonly known as styrofoam. A finished mycelium block is, actually, surprisingly like EPS in both feel, workability, insulative capacity and structural characteristics and offers up an excellent sustainable alternative to that widely used petroleum based product.

With the passage of the 2018 Farm Bill, growing and selling industrial hemp became legal in Michigan. An industrial hemp plant can grow from a seedling to a full 12' in 120 days with little care, no pesticide, and each acre sequesters 2-3 tons of carbon. All of these factors make hemp hurd, the chopped up woody core of the plant, into an ideal substrate to grow mycelium on. Also, when mixed with lime and other pozzolan binders hemp hurd becomes hempcrete. As part of the course we will meet with a local hemp farmer/builder and discuss his process for growing and processing hemp.

Mycelium/Hemp substrates and Hempcrete take on the form of the vessel within which they are grown or pressed. So working with these materials involves casting. A great deal of effort and thought in this class will be devoted to mold making processes, incorporating both analog and digital fabrication methods. Additionally, we are interested in exploring the potential of composite hybrid structures, combining Mycelium/Hemp substrates with materials such as: fabric, cardboard, hempwood, softwoods/hardwoods, compostable 3D printable filament...Given time we may investigate the use of other materials such as bio-plastics. Our end goal will be to craft useful designed objects from these unique materials.

Course Pre-requisites: Curiosity, patience, and a willingness to get your hands dirty!