CourseNo: ARCHA4786_001_2013_3

Meeting Location: AVERY HALL 300

Meeting Time: R 12:00P-02:00P

Instructor Information: Amanda J Parkes

Current fabrication methods for the development of materials are energy intensive in production and unsustainable in nature, often utilizing non-renewable fossil fuel resources for production and transportation necessities. New methods in growth and aggregation which use living organisms in the production of materials present possibilities for materials which can be immediately intertwined with natural cycles of waste and renewal.

This course investigates new materials and new creation processes for biomaterials which present an alternate future for building which taps into the natural processes of living things for growth and fabrication. A biomaterial can be defined as a substance that has been engineered to take a form, alone or as part of a complex system, through control of interactions with components of living systems, encompassing elements of biology, chemistry, materials science, and tissue engineering. We will investigate concepts including mycelium (fungal based) bricking systems, 3D fabrication using live silk worms, solar 3D printing from sand, and textiles grown from bacterial cellulose.

Approaching materials from a sustainable perspective must include an investigation of materialized energy, as all materials represent a specific embodied energy both in their natural chemical state (electrical, magnetic, mechanical) or artificially, as a measurement of the process energy of production or transportation. Natural metabolisms of the body, from the microbe to the human scale also present a untapped rich energy landscape. Additionally synthetic biology and the manipulation of growth processes at the level of DNA offer new ideas in how engineering materials from the inside out, on a molecular level, can help build a sustainable future.

The course format will be research focused with weekly hands on lab demonstrations and experiments. Students will be expected to read and interpret high level scientific papers, but from a designer’s perspective - no prior experience with biology or chemistry is required. The project

concepts generated will explore how we can tap into or optimize existing natural infrastructures and biological processes and how these approaches can be combined and appropriated into innovative models for sustainable material production within the architecture or landscape of our built environment and contemporary lifestyle.

The course will feature an all day field trip to *Ecovative Design*, a manufacturer of mycelium bricking for architectural systems (date TBD)

http://www.ecovativedesign.com/