

# The Searle Center for Sustainability Innovations

## Institute of Environmental Sustainability

### at Loyola University Chicago

March 5, 2018

The Searle Center for Sustainability Innovations houses research, courses, business partnerships and demonstration programs where student-faculty teams develop innovative, closed-loop solutions to waste accumulation and greenhouse gas emissions. Sustainability innovations are about designing intelligent products, processes, and systems to optimize reusability and recyclability of material waste. We divert campus waste from landfills while developing, producing and selling marketable products. We clean up water, soil, and critical wetlands by removing and recovering toxins and nutrients. We empower our students to become change leaders by providing immersive research and operation experiences. The result is a cleaner campus where organic waste is converted into renewable energy, fossil fuel consumption is reduced, where ecosystem services provide both environmental and economic value; and where university research reaches out to impact the real world. Signature programs in the Center include:

#### **Solutions to Environmental Problems**

- Solutions to Environmental Problems (STEP) is a wholly unique and interdisciplinary course that focuses on team development of sustainability solutions that are implemented on campus. The course brings together students, faculty, and staff across disciplines with community partners in discussion and action to advance sustainability around different topics including food, energy, water and climate change. STEP courses educate students about environmental problems through an interdisciplinary approach that fosters problem solving, leadership, and business skills by engaging students in collective, solution-oriented projects. Concrete sustainability outcomes from 10 years of STEP include long-term, institutionalized changes that have measurably reduced our campus environmental footprint. These include the ban on the sale of bottled water, the biodiesel and soap production programs, the ban on using trays in campus cafeterias, the Loyola Farmer's Market, and the Winthrop garden and apiary. The programs in the Center for Sustainability Innovations start as ideas that were generated, incubated and piloted in this marque course.

#### **Waste-To-Energy Program**

- *Searle Biodiesel Lab* – Students convert used cooking oil from our cafeterias (and our partner campuses, restaurants, and businesses) into biodiesel. They sell the renewable fuel to Loyola's shuttle bus company which carries students to and from the Lakeshore and Water Tower campuses. Biodiesel diverts a campus waste product and converts it to energy, reducing our consumption of fossil fuels. Z. Waickman, E. Racz, MV Transportation (shuttle bus company), student interns.
- *Biogas Project* – In this EPA funded research project, campus food waste, biodiesel waste, and biochar are combined to make the right carbon-to-nitrogen ratio for anaerobic bacteria to decompose the organic waste. Two products are generated; a liquid organic fertilizer, and biogas which can replace natural gas on campus. S. Lishawa, Z. Zhu, Z. Waickman, D. Monks, B. Carson, student interns.
- *Invasives-to-Energy Project* – Invasive plant species growing in degraded natural landscapes often produce as much biomass as crops grown specifically for energy purposes, but without the environmental costs associated with agricultural production. In this project, our researchers and students are investigating the energy production potential of the most common and detrimental invasive plants in the region and linking ecological restoration and renewable energy production. S. Lishawa, D. Monks, B. Carson, student interns.

#### **Intelligent Products Program**

- *BioSoap Production Program* – Glycerin, the primary byproduct of biodiesel production, is converted to soap that is sold and used in restrooms throughout both Lakeside campuses. Z. Waickman, D. Crumrine, W. Curtin Facilities, Abel Services (Housekeeping), student interns.
- *Arctic Wolf Windshield Wiper Fluid Project* – Waste methanol, another byproduct of biodiesel production, is recovered and reused in biodiesel production. Low purity methanol, unsuitable for biodiesel production, is used to make windshield wiper fluid. Z. Waickman, student interns.
- *Loyola Lip Balm Project* – Honeybee wax from our apiary, combined with organic coconut oil make a great, simple product that students have perfected. Z. Waickman, K. Erickson, student interns.

### **Bioremediation Program**

- *Algal Bioremediation Project* – Nutrient-rich fish wastewater from our aquaponics program is blended with biodiesel wastewater and used as a medium for growing algae. The algae clean the water and when harvested, provide the basis for the fish food students are experimenting with making in-house. Z. Waickman, K. Erickson, C. Peterson, student interns.
- *Soil Bioremediation Project* – Lead toxicity in Chicago's south side neighborhood soils threatens human health. Our students and faculty are researching the effectiveness of mustard and other fast-growing plants in taking-up and removing lead from these soils through bioremediation. L. De Burh, L. Brentner, Z. Zhu, K. Erickson, Chicago Habitat for Humanities, student interns.
- *Wetland Bioremediation Project* – Wetland ecosystems are often exposed to high-concentrations of pollution due to their landscape position low in watersheds. Wetland plants, including invasive species, accumulate large quantities of nutrients, salts, and other anthropogenic pollutants in their tissues. In this project, our students and faculty are investigating the potential to both remove nutrients and salts (e.g. N, P, NaCl) from aquatic ecosystems and improve the function of invaded wetlands by harvesting invasive plant biomass. S. Lishawa, D. Monks, B. Carson, Z. Zhu, N. Tuchman, student interns.

### **About Us**

The Searle Center for Sustainability Innovations is housed in the Institute of Environmental Sustainability at Loyola University Chicago. Our staff and faculty include Zach Waickman, Zhenwei Zhu, Kevin Erickson, Chris Peterson, Larry De Burh, Laura Brentner, Eniko Racz, David Crumrine, Drew Monks, Shane Lishawa, Brendan Carson. Our internal Loyola University Chicago collaborators include Bill Curtin, Kana Henning, and Wayne Magdziarz. Our external business partners include Green Grease Environmental, MV Transportation, Abel Services, Chicago Habitat for Humanities, and numerous Chicagoland universities, museums, and restaurants. The Searle Center for Sustainability Innovations is generously sponsored by the Searle Family Trust.