Small Data

Spring 2020 Generative Design Workshop

Zach Pino · Wednesdays 2pm to 5pm @ Kaplan 225

Description

This course serves as a broad introduction to issues in contemporary product and service design related to **digital fabrication and data-driven form**. Loosely structured around the increasingly viable notion of human-centered 'Hyper-Customization,' students will explore how emergent tools allow a designer to craft an algorithm that in turn creates unique products, services, and experiences matched to each potential user. Students will explore how the collection of data on individual users can be **integrated into every aspect of the design process** — not only in insight discovery and process streamlining, but also in the direct shaping of final products and experiences.

Digital fabrication tools, long heralded by designers and engineers as a more sustainable, efficient, and capable replacement to traditional manufacturing techniques, are becoming widespread and accessible enough to support businesses based on these new sorts of customized products and experiences. Throughout this course, students will be exposed to a variety of digital fabrication tools – including 3d printing, laser cutting, and CNC machining — alongside the language, limitations, and **capabilities of contemporary and near-future digital manufacture**.

Discussions about emerging resources in digital fabrication, issues in design inclusivity and accessibility, **the overlap between contemporary form design and data visualization**, remote data collection techniques, and applications for machine learning and artificial intelligence in design will be included alongside case-studies from the disciplines of design, architecture, and urban-planning. Students will leave the course having **designed a thing that in turn designs an infinite variety of other things**, enabling every potential user to have an experience that is fundamentally designed for them.

Format

This course will be structured as an experimental laboratory, with many opportunities for students to pursue their own independent areas of interest after a phase of technical skill-building, demonstrations, and exercises.

A singular final project will task students with framing and executing a project of their own choice featuring the techniques and approaches covered in class.

A diverse set of resources and technical skills will be presented and reinforced throughout the semester.

Office Hours

Thursday 10:00–12:00 and 14:00–16:00

Tuesday morning in-person meetings, and Friday remote meetings, can be pre-arranged by email.

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Learning Objectives

- Acquire a basic understanding of programmatic form and visualization expression in code, instruction, data structures, and algorithmic pipelines
- Confront 'designer-agency' issues inherent to contemporary design practices that implicate computational design tools
- Engage challenges in design inclusivity and product accessibility through data and computational lenses
- Attain a high-level understanding of digital fabrication technologies and their appropriate uses and limitations
- Identify opportunities for embedding data in physical and digital products
- Use mathematical, computational, and data-oriented principles to achieve design objectives
- Become more comfortable in failure, and persevere through technical challenges
- Make stuff regularly and ambitiously!

Potential GenDes Tools

- Rhinoceros 3D
- Grasshopper
- SVG and GCode
- Python
- Laser Cutting
- 3D Printing
- CNC Machining
- Moldmaking and Casting
- Knitting and Weaving

Learning Support Covenants

Illinois Tech’s Accessibility Commitment

IIT is committed to fostering a campus that is increasingly accessible to people with disabilities. Each year IIT strives to remove obstacle that might impede learning and makes significant accessibility improvements to the campus.

Illinois Tech’s Statement on Community, Inclusion, and Diversity

Illinois Institute of Technology is a community that values and respects its members. We appreciate that our faculty, staff, students, alumni/ae, and trustees come from many backgrounds and many parts of the world. We embrace the contributions that differences offer. We are committed to providing a working and learning environment in which all students and all members of the faculty and staff are able to realize their full potential.

Pre-requirements

- Command of Adobe Illustrator, InDesign, and Photoshop or equivalents
- Willingness to prototype many ideas quickly
- Comfortability with working both individually and in teams, and providing honest critique
- Experience in sourcing, manipulating, and transforming data preferred, but not required

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Expectations

Students are expected to spend an average of 10 hours of outside-of-class time on…

- Idea development
- Primary, secondary, and prototyping research
- Technical exercises and tutorials
- Weekly "Dear Data" visualization experiments
- Readings

Onerous, and often unpredictable, financial expenditures on software and materials are an unavoidable part of the product design process. All efforts will be made to limit out-of-pocket costs, though students will likely need to spend $195 on Rhinoceros 3D, and up to $100 on digital fabrication services. **ID can help**, but formal requests for assistance must be made to faculty and school administration.

Grading

Students will be evaluated on the scope and ambition of their iteration and exploration, aesthetic quality of their work, participation and collaborative enthusiasm, and the clarity and legibility of their generative forms.

General Reference

Information is Beautiful
New York Times Data Journalism Lab
Flowing Data
Five Thirty Eight
Creative Applications Network
Data is Beautiful Subreddit
Data Physicalizations
Lynda Rhinoceros 3D Courses
Lynda Grasshopper Courses
Formularch Grasshopper Examples
Shapeways Printable Materials