Human-Centered Design Projects

The Segal Design Institute is the unit of the McCormick School that promotes the importance of design throughout the undergraduate curriculum and is dedicated to fostering innovation among engineering and non-engineering students and faculty. Our students work on projects that produce tangible results and improve the lives of people around the world. Our team-based approach to education encourages students to use design thinking together to solve complex, authentic problems in product, interaction, service, and business design.

Programs of Study

- Manufacturing and Design Engineering Degree (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/segal-design-institute/manufacturing-design-engineering-degree/)
- Segal Design Certificate (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/segal-design-institute/segal-design-certificate/)

DSGN 106-1 Design Thinking and Communication (0.5 Unit)
Integrated introduction to the engineering design process and technical communication. Approaches to unstructured and poorly defined problems; conceptual and detailed design; team structure and teamwork; project planning; written, oral, graphical, and interpersonal communications; use of software tools; discussion of societal and business issues. One lecture, two workshops, lab. Registration for both quarters required. Primarily intended for first-year students.

DSGN 106-2 Design Thinking and Communication (0.5 Unit)
Integrated introduction to the engineering design process and technical communication. Approaches to unstructured and poorly defined problems; conceptual and detailed design; team structure and teamwork; project planning; written, oral, graphical, and interpersonal communications; use of software tools; discussion of societal and business issues. One lecture, two workshops, lab. Registration for both quarters required. Primarily intended for first-year students.

DSGN 208-0 Design Thinking and Doing (1 Unit)
Project-based introduction to design, structured as a hands-on studio course. Students learn methods of design innovation and work in teams, exploring ideas, prototyping solutions, and interacting with users. Intended for non-McCormick students. Prerequisite: Reserved for First-Year Students, Sophomores, and Juniors.

DSGN 220-0 Introduction to Design Sketching (0.5 Unit)
Design sketching to increase one's skills as a basic but essential form of communication. It is the medium for preliminary ideation. Basic rules and skills in a design studio setting.

DSGN 221-0 Advanced Sketching (0.5 Unit)
Advanced sketching techniques. Further development of skills for the design studio setting. Prerequisite: DSGN 220-0 or consent of instructor.

DSGN 240-0 Introduction to Solid Modeling: Solidworks (0.5 Unit)
Solid modeling by creating three-dimensional shapes through two-dimensional sketches. Assemblies of individual parts. CAD modeling theory; modeling objects using different approaches for creating identical features. Lecture balanced with hands-on use of SolidWorks.

DSGN 243-0 Visual Thinking for Design (0.5 Unit)
"Often times when we confront a new problem space we choose to build up our understanding through research, readings and lectures. Visual Thinking for Design will focus upon complementing this understanding through the use of visual stimuli. We will work with visual thinking methods to help expand our understanding of a problem space resulting in a greater generation of ideas and a more tangible organization of our thoughts. No formal prerequisites. DSGN_220, Intro to Sketching, and some experience with Adobe Photoshop would be helpful but not necessary."

DSGN 295-0 Introductory Topics in Design (0.5-1 Unit)
Topics suggested by students or faculty members and approved by the institute; taught at an intermediate level.

DSGN 297-0 Intermediate Topics in Engineering Design (0.5 Unit)
Topics suggested by students and faculty and approved by the institute.

DSGN 300-0 Designing Your Life (1 Unit)
The course will approach life as a series of design projects to help students craft a total life. It includes seminar-style discussions, role-playing, short writing assignments, hands-on making, guest speakers, and individual mentoring and coaching. Prerequisite: Reserved for Juniors and Seniors.

DSGN 305-0 Human-Centered Service Design (1 Unit)
Design of new or improved services that tap deeply into people's needs for connectedness, belonging, and autonomy. Project outcomes may include organizational structures, service designs, and designed products. Prerequisite: DSGN 106-1 or DSGN 208-0.

DSGN 306-0 UX Design (1 Unit)
Hands-on course covering the full range of user experience design, from screen-based experience to interaction with physical products to end-to-end environment design. Prerequisite: DSGN 106-1 or DSGN 208-0.

DSGN 308-0 Human-Centered Product Design (1 Unit)
Project-based course focusing on user needs: observational methods, brainstorming, prototyping, business models, and the social and engineering concerns for product design. Prerequisite: DSGN 106-1 or DSGN 208-0.

DSGN 320-0 Introduction to Industrial Design Methods (1 Unit)
Process of product development from an industrial design perspective.

DSGN 321-0 Advanced Solid Modeling (0.5 Unit)
This course provides advanced instruction on the use of CAD modeling using Solidworks software. Prerequisite: DSGN 240-0 or consent of instructor.

DSGN 322-0 Rendering (0.5 Unit)
This course provides an introduction to Keyshot software, a photorealistic rendering package. Prerequisite: DSGN 240-0 or MECH_ENG 240-0; or consent of instructor.

DSGN 345-0 Computer-Aided Manufacturing (0.5 Unit)
CAM using the NX manufacturing environment to program machining operations for CNC milling. Operations, tool generation, and proper manufacturing geometries. Final project involving design and manufacture, g-code generation, and CNC, with emphasis on design for manufacturing considerations. Prerequisite: MECH_ENG 240-0 or consent of instructor.

DSGN 346-0 Design for Fabrication: NX (1 Unit)
Part design from manufacturing setup and g-code generation to proper machine operation and manufacturing. Final project involving design and CNC manufacturing of a part outside of class time. Prerequisite: MECH_ENG 240-0 or DSGN 240-0; or consent of instructor.

DSGN 348-0 Rapid Prototyping (0.5-1 Unit)
The landscape of additive manufacturing processes and the operation of modern RP and reverse engineering equipment. Prerequisite: DSGN 240-0 or MECH_ENG 240-0; or consent of instructor.

DSGN 350-0 Intellectual Property and Innovation (1 Unit)
The critical role of engineers in the invention/creative process and of technologists in wealth creation.

**DSGN 360-0 Design Competition (1 Unit)** Undergraduate teams compete in McCormick's annual autonomous robot contest. Work begins winter quarter; teams must pass a qualifying milestone to register for credit in spring quarter. Students may register for this course no more than twice.

**DSGN 370-0 Portfolio Development & Presentation (1 Unit)** Creation of design projects that showcase engineering work and further career goals. The portfolio physically presents a story that embodies its creator's goals. Prerequisite: Reserved for Juniors and Seniors.

**DSGN 375-0 Data as Art (1 Unit)** Information visualization across multiple disciplines.

**DSGN 380-1 Industrial Design Projects I (1 Unit)** Design thinking; user-centric principles of design and DFM. Industrial design project for personal portfolio development. Concept ideation and sketching; use of discovery research and data visualization; problem framing and prototyping; design for manufacturing, Keyshot rendering, rapid prototyping. Pt 1 in two-course sequence. Prerequisites: DSGN 243-0 and either DSGN 240-0 or MECH_ENG 240-0 and either DSGN 220-0 or DSGN 320-0; or consent of the instructor. Reserved for Juniors and Seniors.

**DSGN 380-2 Industrial Design Projects II (1 Unit)** Design thinking; user-centric principles of design and DFM. Industrial design project for personal portfolio development. Concept ideation and sketching; use of discovery research and data visualization; problem framing and prototyping; design for manufacturing, Keyshot rendering, rapid prototyping. Prerequisite: DSGN 380-1.

**DSGN 382-1 Service Design Studio I (1 Unit)** This course explores the human-centered approach to the design of services. Students will explore and apply design thinking to client sponsored projects and synthesize both user and client needs to the design of tangible consumer touch points. This includes experiences plans, digital interface designs, communication models, organizational designs, systems and/or brand tonality deliverables. Prerequisite: DSGN 305-0 or DSGN 306-0 or DSGN 308-0; or consent of instructor. Reserved for Juniors and Seniors.

**DSGN 382-2 Service Design Studio II (1 Unit)** This course explores the human-centered approach to the design of services. Students will explore and apply design thinking to client sponsored projects and synthesize both user and client needs to the design of tangible consumer touch points. This may include experiences plans, digital interface designs, communication models, organizational designs, systems and/or brand tonality deliverables. Prerequisite: DSGN 382-1.

**DSGN 384-1 Interdisciplinary Design Projects I (1 Unit)** Open-ended, team-based product or system design projects in real-world settings. Sequence must be taken in consecutive quarters. Project research, concept development, professional communication, advanced topics in design. One of DSGN 305, DSGN 306, or DSGN 308 is recommended before taking this course. Pt 1 in two-course sequence. Prerequisite: DSGN 106-1 or DSGN 208-0. Reserved for Juniors and Seniors.

**DSGN 384-2 Interdisciplinary Design Projects II (1 Unit)** Open-ended, team-based product or system design projects in real-world settings. Sequence must be taken in consecutive quarters. Implementation, evaluation, communication, documentation. Prerequisite: DSGN 384-1.

**DSGN 386-0 Manufacturing Engineering Design (1 Unit)** Hands-on design project addressing manufacturing engineering design topics, such as automation, quality control, process planning, tooling design, concurrent engineering, and continuous improvement. Factory-CAD, Factory-FLOW, and Factory-VIEW. Prerequisite: MECH_ENG 240-0 or consent of instructor. Reserved for Juniors and Seniors.

**DSGN 395-0 Special Topics (1 Unit)** Topics relevant to design engineering and approved by the institute. Prerequisite: consent of instructor.

**DSGN 397-0 Advanced Topics in Design (0.5 Unit)** Topics suggested by students and faculty and approved by the institute.

**DSGN 399-0 Independent Study Project (1 Unit)** Independent study on a manufacturing engineering topic supervised by a faculty member. Prerequisite: consent of instructor.