

# INDUSTRIAL DESIGN (INDD)

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## Courses primarily for undergraduates:

### **INDD 2010: Industrial Design Studio I**

Credits: 6. Contact Hours: Studio 12.

*Prereq: Enrollment in INDD major*

This is the first studio in the program introducing students to the industrial design process by focusing on the fundamentals of problem solving, critical thinking, basic market research and subsequent idea generation, emphasizing on sketching, experimentation, model making, visual and physical communication, and presentation. (Typically Offered: Fall)

### **INDD 2020: Industrial Design Studio II**

Credits: 6. Contact Hours: Studio 12.

*Prereq: Enrollment in INDD major; INDD 2010*

Through a series of exercises, the second studio in the program advances students' skills in sketching, modeling and visual, physical and communication skills required for industrial design practice. Students will be implementing the use of new technologies in digital drawing, computer aided design (CAD) and analog and digital fabrication. (Typically Offered: Spring)

### **INDD 2100: Fundamentals of Industrial Design**

Credits: 3. Contact Hours: Lecture 3.

Introduction to the discipline of Industrial Design: its definition, scope and basic principles of the profession as a whole. Overview of technical, artistic and social context of the profession.

### **INDD 2200: Concepts of Sketching and Making I**

Credits: 3.

Introduction to basic tools and techniques used in different phases of the industrial design process. This course is the first in a series of two addressing key aspects of analog and digital communication tools and fundamentals of prototyping from different modes of sketching to physical sketch models.

### **INDD 2400: Digital Tools For Industrial Design**

Credits: 3. Contact Hours: Lecture 3.

Introduction of digital applications and workflows through the lens specific to industrial design tasks and professional practices.

### **INDD 2500: Activity-Centered Industrial Design**

Credits: 3. Contact Hours: Lecture 3.

Introduction to design for complex and dynamic situations that include people, products, activities and environments. Emphasizes the relationship between internal and external factors that impact pleasure and performance in these systems. Includes an overview of human diversity and examines the role of the industrial designer in developing the artifacts of daily activity.

### **INDD 2600: Design Engineering: From Thought to Thing**

Credits: 3. Contact Hours: Lecture 3.

What is making, building, constructing, engineering and technology and their roles for industrial design? Investigation of making techniques, engineering methods and technological advancements through case studies of everyday objects. Exploration of questions about the impact of materials choice and technologies of fabrication. Modeling, prototyping capabilities, and constructing a par with the engineering realm. Application of construction methods to industrial design in an inclusive 'makers-lab' environment.

### **INDD 2800: History of Industrial Design**

Credits: 3. Contact Hours: Lecture 3.

Introduction to contemporary and historic factors influencing industrial design craft and practice. Discussion of social, political, cultural and technological context for industrial design.

### **INDD 3010: Industrial Design Studio III**

Credits: 6. Contact Hours: Studio 12.

*Prereq: Enrollment in INDD major; INDD 2020*

Exploration and application of systematic design methodology including sustainable practices and integration of creative thinking techniques through a sequence of progressive exercises. (Typically Offered: Fall)

### **INDD 3020: Industrial Design Studio IV**

Credits: 6. Contact Hours: Studio 12.

*Prereq: (Enrollment in INDD major; INDD 3010) OR Permission of Instructor*  
Exploration of commercial factors in industrial design. Meets Industrial Design Experiential Learning Requirements.

### **INDD 3200: Design Research Methods**

Credits: 3. Contact Hours: Lecture 3.

Qualitative and quantitative methods with an emphasis on contextual user-centered research. Integration of user data collection, visualization, and synthesis as a source for design.

**INDD 3300: Creative Thinking in Design**

Credits: 3. Contact Hours: Lecture 3.

Exploration and practice of strategies, methods, facilitation, and processes associated with creative thinking skills and problem solving. Investigation of the nature of creativity and its implications in different contexts.

**INDD 3400: Digital Design Technologies**

Credits: 3. Contact Hours: Studio 6.

Emphasis on computer-aided visualization techniques for 3D rendering and digital fabrication. Exploration and practice of several computer modeling applications as digitization tools for industrial design.

**INDD 3450X: Sketchnoting**

Credits: 1-3.

Focus on student learning engagement and knowledge retention through visual note-taking. Introduction to sketchnoting as a creative and non-traditional visual note-taking methodology fostering active listening and synthesis. Learn to create visual libraries as they pertain to select subjects and practice visual notetaking through live lectures and study note development. Reflection sketchnotes will provide students an opportunity to discover their own learning progress and connections across courses. (Typically Offered: Fall)

**INDD 3500: Applied Human Factors Lab**

Credits: 1. Contact Hours: Laboratory 1.

Theory and application of human factors issues in the industrial design field, specifically their impact on the relationship of the user, the product, the product systems, and environment.

**INDD 3600: Materials and Processes for Industrial Design**

Credits: 3. Contact Hours: Lecture 3.

Introduction to materials and manufacturing methods for mass production and distribution of products including design for assembly and disassembly.

**INDD 3700: STEM literacy: How Things Work**

Credits: 3. Contact Hours: Lecture 3.

Dismantling mysteries surrounding science and technology. Identifying key concepts from applied science, engineering and technology to obtain better understanding on how things work. Review and explanation of the principles behind the technologies that define our modern way of life. Common everyday technology such as building electronic gadgets, interface hardware with computers, writing applications, systems applications and making functional electronics units, are some of the examples illustrating scientific knowledge and applications.

**INDD 3800: History and Culture of Objects**

Credits: 3. Contact Hours: Lecture 3.

Critical examination of meanings of objects from the perspectives of history, design, material culture, philosophy and cultural studies. Discussion of social, political, cultural and technological context for industrial design.

**INDD 3810X: Exploration of Design and Artisanship throughout Europe**

Credits: 2. Repeatable.

Academic and cultural visits to major landmarks, production facilities, companies, museums in Germany, France, Belgium and the Netherlands that provide context for understanding more about the traditions and practice of design and craftsmanship. Meets International Perspectives Requirement. (Typically Offered: Summer)

**INDD 3970: Industrial Design Internship**

Credits: 1-6. Repeatable, maximum of 12 credits.

*Prereq: Enrollment in INDD major; INDD 2020; 18 credits in INDD; Permission of Instructor*

Professional industrial design, off-campus experience. Meets Industrial Design Experiential Learning Requirements.

**INDD 4010: Industrial Design Studio V: Commercial Practices**

Credits: 6. Contact Hours: Studio 12.

Repeatable, maximum of 18 credits.

*Prereq: Enrollment in INDD major; INDD 3010*

Advanced topics focused on industrial design applications in commercial industries. Topics vary each time offered. Meets Industrial Design Experiential Learning Credits.

**INDD 4020: Industrial Design Studio: Design for Social Impact**

Credits: 6. Contact Hours: Studio 12.

Repeatable.

*Prereq: Enrollment in INDD major; INDD 3010*

Advanced topics focused on industrial design applications in service-learning and community engagement projects. Topics vary each time offered. (Typically Offered: Fall, Spring, Summer)

**INDD 4350: Strategic Design: Project Management**

Credits: 3. Contact Hours: Lecture 3.

Review and development of executable strategies for entrepreneurial, commercial and business efforts. Focus on strategic thinking, economics of innovation, tactical approaches and effective measures in order to integrate a full cycle of product/service development. Advanced technical design processes, design management, decision-making and value proposition.

**INDD 4400: Portfolio and Professional Practice**

Credits: 3.

*Prereq: Enrollment in INDD major; INDD 3010*

Discussion of industrial design practices, job market and career roadmap planning. Development and preparation of personal promotional materials for a range of media, including professional websites, personal brand, resumes, cover letters, business cards, print and/or digital portfolios.

**INDD 4600: Product Realization**

Credits: 3. Contact Hours: Lecture 3.

*Prereq: Enrollment in INDD major; INDD 2020*

Advanced techniques of prototyping and model making for industrial design, using materials and manufacturing methods for product development. Exploration of the stages of design fabrication, systems-level implementation, testing, and constructing a par with the engineering realm. Use of typical prototyping materials, such as foam, wood, metal, plastic, plus new and emerging materials; CNC and 3D printing technologies will also be applied. Coupling the 'makers-lab' movement with design entrepreneurship, development of advanced functional models and high-fidelity prototypes.

**INDD 4650X: Textiles for Softgoods**

Credits: 3. Contact Hours: Lecture 3.

Repeatable.

This course provides an introduction to the study of textiles and their use in industrial soft goods applications. Instructional methodology includes application-oriented projects focused on the manufacture, acquisition, and utilization of textiles for product development and industrial uses.

**INDD 4900A: Special Topics: Theory, Criticism, Methodology**

Credits: 1-6. Repeatable, maximum of 18 credits.

*Prereq: Instructor Permission for Course*

Advanced topics focused on theory, criticism, and methodologies in industrial design applications. (Typically Offered: Fall, Spring, Summer)

**INDD 4900B: Special Topics: Experimental Techniques**

Credits: 1-6. Repeatable, maximum of 18 credits.

*Prereq: Instructor Permission for Course*

Advanced topics focused on industrial design applications. Topics vary each time offered. (Typically Offered: Fall, Spring, Summer)

**INDD 4900C: Special Topics: Three-Dimensional Design**

Credits: 1-6. Repeatable, maximum of 18 credits.

*Prereq: Instructor Permission for Course*

Advanced topics focused on distributed collaboration in industrial design applications. Topics vary each time offered. (Typically Offered: Fall, Spring, Summer)

**INDD 4900D: Special Topics: Distributed Collaboration**

Credits: 1-6. Repeatable, maximum of 18 credits.

*Prereq: Instructor Permission for Course*

Advanced topics focused on distributed collaboration in industrial design applications. Topics vary each time offered. (Typically Offered: Fall, Spring, Summer)

**INDD 4950: Study Abroad Option**

Credits: 1-12. Contact Hours: Studio 12.

Repeatable, maximum of 12 credits.

*Prereq: Enrollment in INDD major; INDD 2020; Permission of Instructor*

Special topics in Industrial Design, design history, environmental design, historic and contemporary practice. Travel to relevant countries. General cultural and historical studies, topical projects, and individual inquiry. Courses may be taught by departmental faculty or faculty from approved Iowa State Study Abroad programs. See current offerings for detailed syllabus. Meetings industrial design experiential credit requirements. (Typically Offered: Fall, Spring, Summer)

**INDD 4990: Senior Project**

Credits: 6. Contact Hours: Studio 12.

*Prereq: Enrollment in INDD major; (INDD 4010, INDD 3970, or INDD 4950);**Senior classification in INDD*

Advanced practice in specialized area of industrial design. Topics vary.

**Courses primarily for graduate students, open to qualified undergraduates:****INDD 5010: Industrial Design Graduate Studio I**

Credits: 6. Contact Hours: Studio 12.

Fundamental concepts, design processes, and techniques for industrial design. Emphasis on project-based application of design models and procedures for form development, structure, function and communication.

**INDD 5020: Industrial Design Graduate Studio II**

Credits: 6. Contact Hours: Studio 12.

Advanced project-based application of industrial design theories and techniques. Emphasis on service and systems design, and its implications for community and social innovation. Application of entrepreneurial factors and systematic design methodology of complex design problems and innovative solutions.

**INDD 5050: MInD Lab I**

Credits: 3. Contact Hours: Lecture 1, Studio 4.

Repeatable, maximum of 3 credits.

Workshop training sessions based on project-based themes of industrial design: weekly series of 'how-tos' and other practical demos regarding fundamentals, concepts and techniques of Design. Offerings vary with each term; check with department for available sections. Course contact hours can range from (2-0) to (3-0) depending on number of credits.

**INDD 5070: Industrial Design Practicum**

Credits: 6. Contact Hours: Studio 12.

Repeatable.

Studio project focused on topics generated with external partners. Topics vary. Meets Industrial Design Experiential Learning Requirements.

**INDD 5100: MInD Lab II**

Credits: 3. Contact Hours: Lecture 1, Studio 4.

Repeatable, maximum of 3 credits.

Advanced workshop training sessions on application of industrial design concepts and skills: emphasis on executive demos on design thinking, service and system design, and its implications for the community and industry outreach. Offerings vary with each term; check with department for available sections. Course contact hours can range from (2-0) to (3-0) depending on number of credits.

**INDD 5150: Graduate Colloquium**

Credits: 1. Contact Hours: Lecture 1.

Repeatable.

Presentation and discussion of creative practices carried out in various design disciplines and their relationship to industrial design. Seminar sessions focusing on exemplary pieces of: design research undertaken by faculty; design education and learning pedagogies in design; and/or cross-disciplinary graduate work in design-related fields.

**INDD 5200: Design Theory Methodology**

Credits: 3. Contact Hours: Lecture 3.

Synthesis of methodological work in products of design. Theoretical framework that integrates in-depth concepts related to design activity, design science, research philosophies, cognitive models and cognitive biases, design processes from different fields, advanced creativity studies and problem reframing. User-centered research methods to examine the impact of design on humans, environments, and social contexts. Examination and critique of current research methods employed in industrial design, service design, design for interaction and user experience (UX) design.

**INDD 5300: Design Thinking**

Credits: 3. Contact Hours: Lecture 3.

Exploration of design thinking process, toolkits, and mindsets as creative problem solving approaches for systems, products, and processes, across diverse contexts. Strategies for problem-framing, creative solutions and co-evolution process, with a focus on collaborative and interdisciplinary design to investigate real-world problems and opportunities.

**INDD 5400: Design Communication**

Credits: 3. Contact Hours: Studio 6.

Emphasis on design narratives and story-telling. Exploration of creative digital media and multiple visual communication techniques which help break down complex information. Added professional development techniques such as positioning, intrapreneurship, design manifesto, design statement, client rapport, persuasive communication methods and speculative design will be applied.

**INDD 5500: Human Factors: User Experience Design**

Credits: 3. Contact Hours: Lecture 3.

Human factors issues and the study of relationships between the user, the product, and the human body and its physical functions. Advanced investigations of bio-mechanics, anthropometry, instrumental displays and control, and their measurement as they relate to the design process. Emphasis on experience design, user narratives, interactions and context mapping, mapping out issues of usability, design inclusivity, diversity and integrity.

**INDD 5600: Change by Design: Disruptive Innovation**

Credits: 3. Contact Hours: Lecture 3.

Exploration and execution of applied projects on civic entrepreneurship, social innovation and design activism. Through the 3 lenses of strategic, systems and critical thinking, it addresses the importance of design for social impact when applied to cases of service-learning, community-engagement, design ethics and transitional design. Change theory and management are central to examine diffusions and disruptions of innovation. (Typically Offered: Fall)

**INDD 5700: Systems Thinking in Design**

Credits: 3. Contact Hours: Lecture 3.

Emphasis on 21st Century Design Issues through systems thinking as language, problem-framing as pivoting process and transitional design as frame innovation model. Exploration of interconnected and dynamic 21st century global issues, where complexity and future industries play a key role. Issues such as societal transitions, loss of biodiversity and climate change, circular economy, eco-centric design, aging, equity, mobility, robotics, cybernetics, etc. are discussed and mapped out for industrial design applications. (Typically Offered: Fall)

**INDD 5800: Material Culture and Values**

Credits: 3. Contact Hours: Lecture 3.

Examination of the meanings of objects from the perspectives of design, material culture, philosophy and cultural studies. Critically examine the role of objects in everyday life. Concepts include: value of things, semiotics, object fetishism, product semantics, consumer value and production labor. Case studies of historic and contemporary objects will be discussed to understand key theoretical concepts and to make meaningful connection between theory and everyday objects. (Typically Offered: Spring)

**INDD 5900: Special Topics**

Credits: 1-6. Contact Hours: Lecture 2, Studio 2.

Repeatable, maximum of 18 credits.

*Prereq: Instructor Permission for Course*

Advanced topics focused on industrial design applications. Topics include theory, criticism, methodology, experimental techniques, three dimensional design, distributed collaboration. Meets Industrial Design Experiential Learning Requirements. (Typically Offered: Fall, Spring, Summer)

**INDD 5920: Special Projects**

Credits: 1-30. Repeatable.

Planned projects in topics related to theory, criticism, methodology, experimental techniques, three dimensional design, distributed collaboration. (Typically Offered: Fall, Spring, Summer)

**INDD 5930: Experiential Learning Special Projects**

Credits: 1-30. Repeatable.

Project based topics related to theory, criticism, methodology, experiential learning, three dimensional design, distributed collaboration that supports experiential learning. (Typically Offered: Fall, Spring, Summer)

**INDD 5950: Study Abroad Option**

Credits: 6. Contact Hours: Studio 12.

Repeatable.

International study abroad program. Visits to design studios, showrooms, museums and manufacturing facilities. Meets Industrial Design Experiential Learning Requirements. (Typically Offered: Fall, Spring, Summer)

**INDD 5970: Internship**

Credits: 1-6. Repeatable, maximum of 18 credits.

Professional industrial design, off-campus experience. Meets Industrial Design Experiential Learning Requirements. (Typically Offered: Fall, Spring, Summer)

**INDD 5990X: Creative Component**

Credits: 1-6. Repeatable, maximum of 6 credits.

The creative component is a comprehensive and in-depth study and development of a focused project chosen by the student and approved by the major professor. The completed project will culminate in an oral defense, comprehensive documentation and produce an artifact. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring, Summer)

**Courses for graduate students:****INDD 6010: Industrial Design Graduate Studio III**

Credits: 6. Contact Hours: Studio 12.

Advanced studio-based creative component in specialized area of focus within industrial design or cross-disciplinary field. Prepares for graduate design project, culminating in a development plan, project initiation document and supporting documented inquiry.

**INDD 6020: MInD Graduate Project**

Credits: 6. Contact Hours: Studio 12.

Graduate project's creative component in specialized area of focus within industrial design or cross-disciplinary field. Culminates in a physical or digital artifact and supporting documentation such as graduate defense presentation and design process book.

**INDD 6300: Critical Reflections for Thesis Preparation**

Credits: 3. Contact Hours: Lecture 3.

Through the lenses of STEM literacy and critical thinking, exploration of why philosophy of science, technological and engineering literacies are connected to social justice and are related areas. Reflections on the effects of design projects on human health, social structures, and the environment, and examination of improvements in economic growth and quality of life. Case studies on the effects of Design and STEM to prepare for the formulation of graduate thesis or project topics, with proposed plan of investigations. (Typically Offered: Spring)

**INDD 6400: Advanced Digital Technologies**

Credits: 3. Contact Hours: Lecture 1, Studio 4.

Exploration of interactive technologies and digital thinking industries. Advanced concepts in computer to machine interface for manufacture, digital materiality, conversational interfaces, gamification, congruence, mixed reality AR/VR, and critical media for future industries.

**INDD 6990: MInD Graduate Thesis**

Credits: 6. Repeatable.

*Prereq: Instructor Permission for Course*

Advanced research component in specialized area of focus within industrial design. Culminates in a thesis document.