

School of Design Courses

Note on Course Numbers

Each Carnegie Mellon course number begins with a two-digit prefix which designates the department offering the course (76-xxx courses are offered by the Department of English, etc.). Although each department maintains its own course numbering practices, typically the first digit after the prefix indicates the class level: xx-1xx courses are freshmen-level, xx-2xx courses are sophomore level, etc. xx-6xx courses may be either undergraduate senior-level or graduate-level, depending on the department. xx-7xx courses and higher are graduate-level. Please consult the Schedule of Classes (<https://enr-apps.as.cmu.edu/open/SOC/SOCServlet>) each semester for course offerings and for any necessary pre-requisites or co-requisites.

51-101 Studio: Survey of Design

Fall: 9 units

Students will conduct activities that will help them notice design in the world, investigate how it works, and describe their thinking about design, through photography, video capture, sketching, note-taking and modeling. They will work through projects in various ways as a means of 'testing-out' and reflecting on command design approaches. This course is for undergraduate design majors only.

51-102 Design Lab

Spring: 9 units

Introduce concepts and methods to familiarize students with a range of analog and digital modes of working across products, communications, and environments. Students will use desktop modeling and comping methods to familiarize them with a range of basic materials to build confidence in using and manipulating material to represent ideas. This course is for freshman Design majors only.
Prerequisite: 51-101

51-103 Design Workshop I

Fall: 3 units

Design Workshop is a special course created for first year design students and serves as a supplement to primary studio and elective courses. In this course, students will explore design activities related to their core studio courses, receive special skills training, engage with guest lecturers, and attend field trips. Each class meets once per week.

51-104 Design Workshop II

Spring: 3 units

A recitation style course that is conducted in service of the primary design courses during the semester to provide further instruction or engage in activities that support themes and issues related to these other courses. May include work days for students to spend in studio with teaching assistants.

51-121 Visualizing

Fall: 9 units

This course introduces basic drawing and sketching techniques including figure-ground translation, 2 pt perspective construction, storyboarding for explanation, diagramming for clarification, field notation for recording through guided exercises, demonstrations, and short projects.

51-122 Collaborative Visualizing

Spring: 9 units

This course introduces frameworks of notational, exploratory and explanatory sketching using collaborative methods and exercises to cooperatively communicate design ideas. This course is for undergraduate design majors only.
Prerequisite: 51-121

51-132 Introduction to Photo Design

Spring: 4.5 units

Using a digital camera, students learn how to extend their 'seeing' with the camera, both in the world and in a shooting studio. Through shooting assignments student will understand how to: deconstruct image meaning and aesthetic choices, construction of photographic meaning and aesthetics, an understanding of color and how color delivers meaning, how a photographic studio works, proper digital photographic workflow and contemporary trends in photography. Intended for Design Majors, or permission of the instructor.
Prerequisite: 51-101

51-134 Photo Design II

Spring: 4.5 units

A continuation of Introduction to Photo Design Prerequisites: Introduction to Photo Design; 51-132

51-171 Placing

Fall: 9 units

This course will explore the context in which students study design. Using primarily photography, students compare where they are from to the bioregion of the Ohio Valley of Western Pennsylvania and the history of the steel town, Pittsburgh. Students also learn about the modern Western emergence of design as a profession and discipline, and map the edges of current design practice by interacting with local professionals.

51-172 Systems

Spring: 9 units

Explore how to understand complex phenomena by creating models of the interrelations between components. Students learn soft systems diagramming as well as the systems thinking associated with ecologies, integrative science and sociotechnical regimes. Students also learn how to see design as a way of making interventions into a leverage point in a system in order to transform how it functions elsewhere in the system.

51-173 Human Experience in Design

Intermittent: 9 units

This course introduces the central themes of design and the design professions, and the human centered focus in all aspects of design thinking and practice. We will begin by exploring the nature of having an experience, followed by the broad philosophy of design in relationship to other areas of human activity, the sciences and the arts. We will explore design through its orders of activity: first in communication and second the creation of physical objects. But design has a far greater reach into the intangible and more complex areas of human activity: interaction, systems, environments, and culture. These are the topics of inquiry for design and, unlike what the patchwork of professions would have you believe, are not fixed by boundaries. Design is enormously broad and something everybody participates in as we create the artificial world in which we live. Those who call themselves designers have greater power in shaping this world and for that reason we will end the course with a discussion of ethics. Non-Design majors are welcome.

51-201 CD Studio I: Communicating with Type

Fall: 9 units

As the first studio course in the communication design program, students explore fundamental principles of typography, where type is regarded as image, serving a range of communication goals. Projects allow students to explore form and meaning, hierarchy, legibility and readability, structure and composition, with and without images, in print and on screen. Learning to design across media, in static and dynamic formats, is critical for communication designers, as well as becoming proficient with software tools. The co-required 51-203 Computer Lab will focus on learning software relevant to projects being worked on in studio. While typography is a focused branch of communication design, this introduction to the subject opens a path for students to study all facets of communication in subsequent courses. Providing context to the subject, the course covers basic typography history, relevant typographers and their work, and technologies that have shaped typography. A guided visit to the Hunt Library's Rare Book Room provides added context. This course is for undergraduate Communication Design majors only, or permission of instructor for non-majors.
Prerequisite: 51-102

51-202 CD Studio II: Organizing Information

Spring: 9 units

In this course students participate in a range of exercises, projects, discussions, and readings that are geared towards deepening their understanding of communication design and improving their skills. Course activities require students to consider and propose ways to inform, convince, question, and engage their audiences by clarifying and organizing information. Students deconstruct existing pieces of communication design, studying how their composition, type and image usage, and hierarchy reflects the content being communicated and the order in which it is read. Working in print and digital media, students study the similarities and differences among mediums and explore methods for effectively communicating information in each area. Students analyze design examples from the perspective of the maker and the receiver(s). This facilitates discussions that focus on the role of the designer in the communication of information (Should a designer's voice be evident?) and the need for user-centered design solutions. This course is for undergraduate Communication Design majors only.
Prerequisite: 51-201

51-203 Communication Design Computer Lab

Fall: 3 units

This sophomore-level Communication Design lab introduces students to various software that designers use when creating communication pieces. Software is introduced in support of project work in 51201 CD Studio 1, providing students with best practices that help them work efficiently and effectively. Software includes InDesign, Illustrator, and AfterEffects. CD majors only, or permission of the instructor.

51-208 Research Methods

Spring: 4.5 units

Learn how to select, conduct, and develop appropriate research methods for understanding and discovering contextual information and behaviors of human participants.

51-211 Generation of Form: Industrial Design I

Fall: 9 units

Generation of Form is the first studio for students in the industrial design program. Students explore product aesthetics and basic formal issues as they pertain to industrial design. This course integrates the principles of three dimensional design, drawing and prototyping as they apply to the generation of product form. Emphasis is placed on issues that dictate the form of products and their creation. Students develop basic prototyping, conceptual drawing, and presentation skills for the purpose of exploring, analyzing, refining and communicating design concepts. Required of ID students; lab fee. Due to space constraints, this course is only offered to undergraduate Industrial Design majors.

Prerequisite: 51-101

51-212 ID Studio II: Meaning of Form

Spring: 9 units

This studio course introduces students to the functional and expressive meaning of product form through creative exploration and decision-making in design. Functional product attributes include those that guide intuitive, safe, and comfortable use; expressive attributes include aesthetic, cultural, and contextual variables. Students are exposed to various methods of conceptual sketching, prototyping, and documentation to realize and communicate ideas in a process that anticipates human interpretation and response to design. Lab fee applies. This course is restricted to undergraduate Industrial Design majors only.

Prerequisite: 51-211

51-221 Color for Communications & Environments

Fall: 9 units

This course will explore the fundamentals of color through the implementation of various media as they apply to their use in communication and expression in design. While this course does not deal with color theory per se we will spend time on the causes and effects of color interaction, color contrasts, color harmonies and color strategies for the effective use of color in our visual design work. We will use both nature and man made constructs to discuss how color affects what we see and its effect on our visual world. Short exercises and longer- term projects will be the vehicles of our explorations. This course is for Sophomore Design Majors.

Prerequisite: 51-122

51-222 Decoding Place

Spring: 9 units

This course will explore ways to decode, see, think and interpret the visual language of 'place'. Through the intersection of found symbols, signs, images and color we will bring to light the function and purpose of our surroundings, and how they speak to natural and the built environment. During the course we will investigate the following question; How do we design visual systems which are understood by everyone, regardless of their language or culture but also work in harmony with natural systems? Students will work with traditional materials and tools as well as computers to understand the strengths and limitations of each, comparing their similarities and differences in the context of theoretical and applied projects. This course is for Communication Design majors only, or by permission of the instructor.

Prerequisites: 51-201 or 51-211

51-223 Color for Communications & Products

All Semesters: 9 units

This course will explore the fundamentals of color through the implementation of various media as they apply to their use in communication and expression in design. While this course does not deal with color theory per se we will spend time on the causes and effects of color interaction, color contrasts, color harmonies and color strategies for the effective use of color in our design work. We will use both nature and man made constructs to discuss how color affects what we see and its effect on our visual world. Short exercises and longer- term projects will be the vehicles of our explorations. This course is for Sophomore Design Majors.

51-224 CD: Web Design

Spring: 9 units

This class will introduce the basics of designing and building websites, the fundamentals of HTML5 and CSS3, and responsive design approaches to assist students in creating semantically sound web pages that can be viewed across a variety of platforms, devices and browsers. The class will help students understand the constraints and advantages of working with the web as compared to traditional print media. Students will also be exposed to content management systems and topics such as responsive web design, research, and information architecture. Upon completion, students will be capable of designing, creating, launching and managing their own web sites. Your own laptop is required, with the following software installed: Adobe CS 5 or later. This course is for Communication Design Majors only.

Prerequisite: 51-201

51-225 Communications Studio I: Understanding Form & Context

Fall: 4.5 units

Giving form to messages and information using type, color, and images will be the focus of this introductory studio in Communication Design. Understanding the connection between content, intent, and form will be the goal of every project and exercise. Principles of hierarchy, chunking, sequence, clarity, and visual voice will guide work for the screen and the printed page, in dynamic and static forms.

Prerequisite: 51-122

51-227 Prototyping Lab I: Communications

Fall: 4.5 units

Learn the basics of the CS suite, particularly InDesign (style sheets), Illustrator, and Photoshop; learn basics of HTML 5.0; the learning of software ideally will align with the activities conducted in the Communications Studio. This is a requirement for Design sophomores studying Communications.

51-228 Communications Studio II: Designing Communications for Interactions

Spring: 9 units

This design studio focuses on designing communications for interactions. Through projects that vary in scale and complexity, students explore ways of inciting interaction and providing feedback in print and digital mediums to recognize the dynamic attributes of communication design. Communication structures both traditional and emergent serve as the backbone of the course, as they provide opportunities for students to seek and discover patterns in communication design conventions and apply what they learn to their own work to illicit specific types of interaction. Course projects specifically emphasize the importance of narrative structures to communication design. They prompt students to sketch, diagram, and visually weave together layers of information as a means of moving audiences through a sequence of dense content. This process helps students investigate narrative structures as frameworks that shape interactions with communications and impact audience experiences. The course concludes with an introduction to systems design, where students explore designing for interactions across a set of communication pieces.

Prerequisite course includes Communications Studio I.

Prerequisite: 51-225

51-229 Digital Photographic Imaging

Fall: 9 units

The objective of this course is to provide students with a practical, technical and theoretical foundation in digital imaging. The primary software for this course is Adobe Photoshop, with which students will explore construction, combination, manipulation, input, and output of image as a means of narrative creation. Through project critique and other discussion, we will also consider the aesthetic and political implications of the emergence of this and other new electronic imaging technologies.

51-231 Calligraphy I

All Semesters: 9 units

Working with pure unadorned Roman letterforms, this course introduces students to the theory and practice of hand-generated letters, employing a variety of mark-making tools. This course provides an in-depth understanding of the basic principles and techniques of the art of formal writing. Rhythm, texture and composition are achieved through routine, elementary exercises using geometric forms, demanding concentration and manual discipline with the development of hand-eye coordination. The function, use, and harmonious sequencing of letterforms is taught through weekly projects. Awareness of rhythm, texture and letterform structure is achieved through routine exercises. Drills, demonstrations, discussions, individual and class critiques are on-going. Additional related topics and activities introduced in class include books: binding and design. A brief introduction to the historical development of our Western alphabet is provided through film, slides, demonstrations, with discussion of twentieth-century type designs. Students also gain exposure to letter vocabulary, paleography, monographs, words and punctuation, classical page design, publication design-past and present, and calligraphy's role in design today. Thinking with hands and eyes, the manual placement and spacing of letters practiced in this course awakens sensitivity and judgment in the designer.

51-232 Calligraphy II

All Semesters: 9 units

This course serves as a continuation and deeper investigation of topics explored in Calligraphy I, where students tackle advanced problems in calligraphy and lettering. The introduction of new hands is to be decided by the student and instructor. Prerequisites: 51231
Prerequisite: 51-231

51-236 Information Design

Fall and Spring: 9 units

This undergraduate IDEATE design course focuses on teaching a basic visual design process from start to finish. Students will work individually and in teams to gain proficiency in applying specific design methods to information design challenges at each stage of the design process.

51-239 Prototyping Lab II: Communications

Spring: 9 units

Program simple websites as a means of learning basic HTML 5.0 and CSS; prepare documents for digital and print production using Adobe InDesign, Illustrator, Acrobat
Prerequisite: 51-227

51-241 How People Work

Fall: 9 units

51241 How People Work: Human Factors (ID/CD Lab I) This course is a general introduction to the field of human-centered design and applied human factors. It centers on the understanding of physical, cognitive, and emotional human needs and desires, including methods employed to acquire this information and translate it into useful criteria for the design and evaluation of products. Lecture, discussion, lab exercises, and projects are employed. Required of all sophomore design students. Others admitted by permission of instructor only.

51-242 How Things Work: Mechanics and Electronics

Intermittent: 9 units

This course investigates the basic principles of mechanics and electronics. Through the combination of lectures, investigations, and lab experiments, students develop simplified representations of complex systems. The skills of freehand drawing, mechanical drawing and three-dimensional models are employed and developed during the project sequence. Instructor permission required for non-Design majors.

51-243 Prototyping

Fall: 4.5 units

A half-semester laboratory mini-course introducing a range of materials, methods, and workshop techniques by which designers prototype designs in three dimensions. Basic competence in shop techniques is established by bringing to realization a series of simple artifacts. Studio and model shop tools are required; lab fee. This course is for ID majors only.

51-245 Products Studio I: Understanding Form & Context

Fall: 4.5 units

Learn basic design processes for understanding the scope of the project, brainstorming, defining the problem, and how interactions aid in developing solutions in relation to a human and user centered activities.

51-246 Visual Communication Fundamentals

Spring: 4.5 units

Design elements are powerful tools for reaching your audience. The objective of this course is to help you understand how to use the fundamental visual tools of communication in your work, and to learn how to evaluate visual communication pieces you encounter in everyday life. Examples of design elements that we will explore are: type, color, format, images, text, pacing and sequencing. We will learn how to use these together to successfully communicate a portfolio of documented design work. This course is required for all ID sophomores.
Prerequisite: 51-211

51-247 Prototyping Lab I: Products

Fall: 4.5 units

Work in various 2D and 3D mediums to represent ideas and solutions; introduce students to digital fabrication methods and output; utilize Adobe CS suite - Illustrator, Photoshop, InDesign to communicate 2D representations.

51-248 Products Studio II: Designing Products for Interactions

Spring: 9 units

Introduce student to 3D semantics, how form communicates meaning, and how to make meaningful objects through appropriate material choices and mechanical manipulation; utilize a range and combination of analog and digital tools for higher fidelity output.
Prerequisite: 51-245

51-249 Prototyping Lab II: Products

Spring: 9 units

Introduce students to high fidelity modeling techniques through a series of machines, processes, and or methods to simulate desired form, scale, and proportions
Prerequisite: 51-247

51-251 Digital Prototyping

Fall: 4.5 units

A half-semester laboratory mini-course introducing 3D modeling software. Each class meeting consists of an introduction to and demonstration of specific aspects and functions of SolidWorks software. At the end of each class session, work related to the covered topic(s) will be assigned for completion by the next class meeting. This course is a requirement for all ID majors. Instructor permission required for non-ID majors. Corequisites: 51-211

51-257 Introduction to Computing for Creative Practices

Intermittent: 10 units

This course is an introduction to Java programming for designers, architects, artists and other visual thinkers, using the popular "Processing" Java toolkit for interactive graphics. Intended for students with little or no prior programming experience, the course uses interaction and visualization as a gateway for learning the traditional programming constructs and the fundamental algorithms typically found in a first course in programming. Students will become familiar with essential programming concepts (types, variables, control, user input, arrays, files, and objects) through the development of interactive games, information visualizations, and computationally-generated forms. Because of limited space, only Design majors may take this course. Students following an IDEATE concentration or minor should register for 15-104.

51-261 Communication Design Fundamentals: Design for Interactions for Communications

Fall: 9 units

A one-semester course that introduces non-majors to the field of communication design. Through studio projects, lectures, and demonstrations, students become familiar with the visual and verbal language of communication designers, the design process, and the communicative value of word and image. Macintosh proficiency required. This course is required for HCI double majors and Design minors. Section W - Qatar campus only

51-262 Communication Design Fundamentals: Design for Interactions for Communications

Spring: 9 units

A one-semester course that introduces non-majors to the field of communication design. Through studio projects, lectures, and demonstrations, students become familiar with the visual and verbal language of communication designers, the design process, and the communicative value of word and image. Macintosh proficiency required.

51-264 Product Design Fundamentals: Design for Interactions for Products

Spring: 9 units

A one-semester course that introduces non-majors to product development from the product designer's point of view. Through studio projects, lectures, and discussions, students will gain experience in visualizing a product for mass production. Case histories and the analysis of existing products will supplement hands-on experience in developing product concepts. This course is required for all Design minors. This course replaces the course previously listed as Industrial Design Fundamentals.

51-265 Environments Studio I: Understanding Form & Context

Fall: 4.5 units

Learn the basic design processes for experience-driven multi-modal environments, making meaningful physical and virtual experiences through planning, structuring, and explaining/visualizing; utilize a range and combination of analog and digital tools for high fidelity output.

51-267 Prototyping Lab I: Environments

Fall: 4.5 units

Learn methods for designing interactions in environments through experiencing the space, low-fi prototyping, rapid making, 3D CAD software and video sketching. Express multi-modal aspects of integrated physical-digital-hybrid environments.

51-268 Environments Studio II: Designing Environments for Interaction

Spring: 9 units

Introduce students to the concept of resonant environments that provide meaningful physical and virtual experiences; utilize a range and combination of analog and digital tools for high fidelity output.
Prerequisite: 51-265

51-269 Prototyping Lab II: Environments

Spring: 9 units

Explore simple reactive and interactive programming as a means to support virtual and hybrid digital/physical environments.
Prerequisite: 51-267

51-271 How People Work

Fall: 9 units

Exposure to holistic/emotional, cognitive, and physical factors of people, as approached by designers and interpreted by user/audience, delivered through lectures, readings, and hands-on lab activities; apply principles in team project utilizing human centered field research and design response.

51-272 Cultures

Spring: 4.5 units

Explore the many often-unbridgeable differences between people. These differences may be not only ethnic, but also related to gender, age, class. The course will survey critical theories that are useful for warning of these kinds of differences. Students will also explore strategies for negotiating these differences, many of which require time and working at multiple levels.

51-301 CD III: Type, Form, Meaning and Context

Fall: 9 units

This course develops advanced skills in typography and communication design, including the study of type and motion. Students learn to conceptualize and visualize more complex bodies of information for a variety of communicative purposes. Projects encourage students to develop a deeper understanding of the expressive potential of type and image and to develop critical and creative thinking skills with which to assess the effectiveness of their own work and that of their peers. Course objectives are to encourage an active exchange of ideas and information which allow students to develop the ability to clearly articulate their ideas and thought processes in relation to their work. This leads to a more focused method for developing and expressing ideas effectively. Instructor permission required for non-CD majors. Prerequisites: 51202
Prerequisite: 51-202

51-302 CD Studio IV: Designing with Systems

Spring: 9 units

This course is the final studio in a sequence of communication design courses for Design majors. It builds on skills and knowledge acquired in the prior three studios. The course focuses on creating a system of designed pieces using large amounts of content, either self-generated or found, in print and digital platforms, at varying levels of scale. The differences and similarities between existing and emerging platforms of delivery provide students opportunities to investigate the future direction of communication design. Data-driven methods are utilized as a means of research and communication. Projects are situated in social contexts, where student study design systems using type, sound, and images. This course is required of Communication Design majors in the School of Design. Prerequisite courses include Type III, Type II, and Type I.
Prerequisite: 51-301

51-311 Product Design ID III

Fall: 9 units

Students participate in a range of exercises, projects, discussions, and readings that are geared towards deepening their understanding of product design. The activities they engage in will require them to understand and consider the user as the key motivator for new and intelligent concepts that address identified problems/needs. To assist them, systematic processes will be introduced (or built upon) to guide inquiry, ideation, conceptual development, and presentation of products that are useful, usable, desirable, and more feasible than their work to date.
Prerequisite: 51-212

51-312 Products in Systems: ID IV

Spring: 9 units

This course introduces the themes of product planning and the development of products within systems and as systems. The projects are broad in scope and require students to develop products that reflect an understanding of the entire development cycle. Tools and skills for the studio and model shop are required; lab fee. Instructor permission required for non-ID majors.
Prerequisite: 51-311

51-319 Digital Photography in the Real World

Intermittent: 4.5 units

DIGITAL PHOTOGRAPHY IN THE REAL WORLD Photographers are active observers. They look until they see what they want others to see -then they compose and click the shutter. In this course students will walk streets with their cameras. They will learn how to use their cameras to better understand what they believe is important, beautiful, and/or intriguing in the world. They will also learn how to communicate their imagery to others through screen-based and print output. Assignments range from accurately describing reality, to showing aspects of life that should be improved, to making images for purely aesthetic reasons. There are two main goals to this course: learning the fundamentals of operating a digital camera and producing digital output; and, learning to become better 'seers' in the world. Students must own a camera but no prior photographic experience is necessary.

51-321 Photographic Narrative

Intermittent: 9 units

Most photographs tell stories. We see photographs in newspapers, magazines, snapshot albums, on the web, in books, and in posters. In these contexts photographs often work with words to convey meaning, whether they are shown with captions, news stories, or just with titles. Photographs can work without words, too, to create purely visual narratives. In this course, students will make a photo narrative and determine how it will be seen. Students may make photo books, for example, or decide that their images will be seen digitally on screen. While students are making photographs, we will explore the rich traditions of photographic story-telling that range from the world-oriented work of photo-journalist W. Eugene Smith to the documentarians such as Walker Evans, Nicholas Nixon, and Alec Soth. We will look at photographers, too, who construct fictional worlds, such as Duane Michals, Cindy Sherman, and Gregory Crewdson. As students make their own narratives, we will look at the interplay between words and photographic images; how images are paced and scaled to create rhythm; how photographs are sequenced to tell stories; and other formal elements involved in creating visual narratives. 12-15 students. Prerequisite-a college level photography course.

51-322 Advanced Digital Imaging

Intermittent: 4.5 units

Building on the technical skills and methods of communicating narrative learned in Digital Imaging Advanced Digital Imaging takes communication to the next level of resolution with particular concern in artifact creation. Students explore historical and groundbreaking means of content delivery.

51-323 Communications Studio III: Designing for Complex Communication Systems

Fall: 9 units

Gain a greater understanding of how to craft communications that resonate with specific people by researching topics/audiences/contexts, by developing/iterating/testing concepts, and by investigating deeply the nuances of typographic form/image/sequencing of interactions; learn how to craft graphic form to express ideas that are not dependent on the reading of words themselves; continue to develop communication systems
Prerequisite: 51-225

51-324 Basic 3D Prototyping

Spring: 4.5 units

A half-semester laboratory mini-course introducing a range of materials, methods, and workshop techniques by which designers prototype designs in three dimensions. Basic competence in shop techniques is established by bringing to realization a series of simple artifacts. Studio and model shop tools are required; lab fee. Instructor permission required for non-CD majors.

51-326 Photography & Family

Intermittent: 9 units

Picturing Families at Sojourner's House In this course we will partner with Sojourner's House to tell photo-based stories of the residents. Sojourner's House (SH), located in East Liberty, is a home for women and families who have faced obstacles of addiction and homelessness. Those at SH have lived through hard times. The women, some of whom are mothers, are now 'clean and sober' but before they came to SH, they were addicts who lived strained lives. As a class we will be working with women and families who now are creating positive change in their lives through Sojourner's House supportive environment. Students, working in pairs, will team with individuals or families. Through weekly sessions, students will explore how the camera can be used to tell a range of different stories, which may range from a traditional photo documentary, to a narrative that is 'directed' by a student with photographs made by Sojourner's House residents. Students may work with children to show their day-to-day life; they may work with an individual woman to tell the story of her dreams; or they may choose to work with staff at Sojourner's House to explore why someone goes into this line of work, to name a range of examples. Students will learn how to sensitively work with people who have experienced extreme difficulty while they are learning about addiction through readings and first hand accounts. While they are getting to know their subjects, students will explore the various ways to create an in-depth photo narrative. Most important, students will learn how the camera can be used to create connections and trust between people. Prerequisite: A college level photography course 12 students - sophomores to grads Familiarity with digital photography

51-327 Introduction to Web Design

Fall: 9 units

This class will introduce the basics of designing and building websites, the fundamentals of HTML5 and CSS3, and responsive design approaches to assist students in creating semantically sound web pages that can be viewed across a variety of platforms, devices and browsers. The class will help students understand the constraints and advantages of working with the web, with this course focused on technically pragmatic solutions for making websites. Students will also be exposed to content management systems and topics such as responsive web design, research, and information architecture. Upon completion, students will be capable of designing, creating, launching and managing their own web sites. Your own laptop is required, with the following software installed: Adobe CS6 or later, as well as other open-sourced software. This course is for Design Majors only, or by special permission of the instructor.

51-328 Advanced Web Design

Intermittent: 9 units

Advanced Web Design builds off of the fundamentals of Introduction to Web Design to make students more sophisticated web designers. Focusing on furthering skills beyond basic HTML5 and CSS3 and responsive design approaches, this course will also delve more deeply into web research and strategy; content development; hierarchy; design thinking; search engine optimization; and introduce students to the basics of PHP and javascript. Students will also gain a basic understanding of databases, work with content management systems, and design and develop for divergent platforms such as phones, tablets, and desktop computers. With an interdisciplinary, team-based approach, students will develop advanced websites while mastering HTML5 and CSS3, looking at what is viable for implementation today as well as looking forward at what technology is reasonable in the near future of web design. Your own laptop is required, with the following software installed: Adobe CS6 or later, as well as other open-sourced software. Students are required to be competent with building responsive web pages to take this course.

51-330 Communications Studio IV: Designing Communications for Social Systems

Spring: 9 units

As the final course in a sequence of studio courses for Communication Design majors, this one builds on everything learned previously. Apply skills/knowledge learned in researching, developing, evaluating, refining communications to multi-faceted communication challenges that warrant the design of multiple communication pieces that span diverse mediums (in print and digital platforms) and function as a system; learn how to design for futuring (parts of the system yet to be determined) and for co-design where parts of the system are made for growth through contributions from audiences. This course is required of Communication Design majors in the School of Design.

51-331 Advanced Calligraphy I

All Semesters: 9 units

This course serves a continuation of study in the discipline of calligraphy. (It meets at the same time as Calligraphy I.) Students may take one of two directions in the course. (1) Enlarging their repertoire of scripts, contemporary or traditional, for use in limited areas of work such as book or display work, or (2) Concentrating on more intensive problem solving using a limited repertoire of scripts such as Roman, Italic, Sans Serif. Prerequisites: 51232
Prerequisite: 51-232

51-332 Advanced Calligraphy II

All Semesters: 9 units

This course serves a continuation of study in the discipline of calligraphy. (It meets at the same time as Calligraphy II.) Students are encouraged to tackle advanced problems or work with the instructor to determine new directions of study. Prerequisites: 51331
Prerequisite: 51-331

51-334 Photography, Community & Change

Intermittent: 9 units

In this course we will partner with Sojourner's House to tell photo-based stories of the residents. Sojourner's House (SH), located in East Liberty, is a home for women and families who have faced obstacles of addiction and homelessness. Those at SH have lived through hard times. The women, some of whom are mothers, are now 'clean and sober' but before they came to SH, they were addicts who lived strained lives. As a class we will be working with women and families who now are creating positive change in their lives through Sojourner's House supportive environment. Students, working in pairs, will team with individuals or families. Through weekly sessions with SH residents, students will explore how the camera can be used to tell a range of different stories, which may range from a traditional photo documentary, to a narrative that is 'directed' by a student with photographs made by Sojourner's House residents. In all cases, the residents at SH are going through significant change in their lives and we will see how the camera can be used to support individuals during a time of growth. Students will learn how to sensitively work with people who have experienced extreme difficulty while they are learning about addiction through readings and first hand accounts. While they are getting to know their subjects, students will explore the various ways to create an in-depth photo narrative. Most important, students will learn how the camera can be used to create connections and trust between people. Prerequisite: A college level photography course 15 students - sophomores to grads Familiarity with digital photography

51-335 Mapping and Diagramming

Fall: 9 units

This course explores the different ways in which we communicate complex information, through maps and diagrams. Students will design maps and diagrams using subject matter of their choice. Instructor permission required for non-Design majors.

51-336 The Non-Selfie

Intermittent: 9 units

The Non-Selfie: using the camera to record, probe, and understand one's own and another's behavior. This course is the opposite of the selfie, but it uses the camera to record human behavior, both your own and another's. Designers need to be good human observers in order to design for human needs. Designers also need empathy. This course aims to deepen sensitivity to others by first better understanding ourselves. Informed by Manfred Max-Neef's classification of fundamental needs and other relevant materials, we will create two in-depth photo-essays, the first being a study of ourselves, the second being a study of someone who is unfamiliar to us. In the first half of this course, while looking at the tradition of self-portraiture in photography and other media, we will be making in-depth photographic stories of ourselves. In addition to photographs, we may make scans of objects, include personal artifacts and anything else that may contribute to building an in-depth self-portrait. In the second part of the semester, we will apply what we learned to a person who we do not know, in hopes of bringing new insights and methods to understanding for another. In addition, we will look at the rich literature that exists in documentary photography about representing "the other." By the end of the semester, each student's work will be made into a hand-made Japanese stab book of two volumes: a volume on oneself, and one on another. The skills learned in this course are immediately relevant to becoming a good designer.

51-337 Letterpress in a Digital World

Intermittent: 9 units

What value does the antiquated process of letterpress printing have in our current digital world? What can we learn from the process that was used as the primary form of reproducing the printed word for nearly 500 years? As designers and artists, we have the opportunity to re-examine an obsolete mode of commercial printing, and explore how these techniques and technologies can add to our experience, expand our repertoire, and invigorate our working process. Our goal in this course is to seek out new opportunities in expression, resulting from the harmonious merger of new and old technologies. Intended for design juniors and seniors

51-338 Documentary Photography

Intermittent: 4.5 units

Documentary Photography: the Social and Built Landscape Documentary photography explores issues, often social, humanistic and/or political, in man-made culture. This course examines the work of nineteenth, twentieth, and twenty-first century documentarians while students photographically investigate their own topics. Among the many ethical areas of a documentarian's concern, the course examines (through looking at the documentary tradition and through the student's own work) the following: the photographer's relationship to the subject; the choices involved in representing the subject; the act of selectivity in framing the subject; the reasons for making documentary photographs; the intended audience for documentary photography; and the appropriate final display of the photographs? Extensive shooting, printing, and library research. Prerequisite: A beginning photography course, or by the permission of the instructor.

51-341 How Things are Made

Fall: 9 units

This course will provide a breadth of knowledge for current manufacturing, materials, and processes encountered in the industrial design field. There will be an emphasis on actual production/manufacture methods and not rapid prototyping methods. The class will consist of various lectures, media, electronic tools, and on-site visits to enable an understanding of how mass production affects design and design decisions. Industrial Design Juniors & Seniors or permission of the instructor.

51-343 Products Studio III: Designing for Complex Products Systems

Fall: 9 units

Provide a framework for understanding core practices of the product design profession by placing it in relation to other disciplines and their influences on mass manufacture of goods; students will use a design process to identify problem/s, map a process in which tangible artifacts are made to learn more about the interaction between object, person, space, and context

Prerequisite: 51-245

51-344 Advanced Digital Prototyping

Spring: 6 units

This course is an advanced course using SolidWorks computer modeling. It is a prerequisite for Production Prototyping.

51-345 Pragmatics of Color for Non-CD Majors

Intermittent: 9 units

Pragmatics of Color for non-CD majors Throughout the course, we will explore the application of color and its' use through many different medium, products and environments. We will use a variety of source materials like pigment, colored paper, and photography. These exercises will help us to explore how the different medium affect color perception. Because color is extremely dynamic and interactive, a good deal of emphasis will be placed on your ability to iterate many variations so that comparison becomes the point of discussion and learning. Equally important, is increasing your sensitivity to the nuances of color through direct observation and experimentation. The class exercises are distinctly different in nature from one to the next; they are organized in order to build upon each other. Prerequisites: you must own a digital camera and have previous experience with Photoshop and Illustrator.

51-346 Production Prototyping

Spring: 6 units

This course is the 2nd half of Advanced Digital Prototyping, using your work in SolidWorks to produce hard models.

51-347 Drawing from Nature

Intermittent: 4.5 units

Drawing From Nature This course is about observing and making images of things growing, crawling, flying, swimming etc. Observations will be made firsthand in the field, supported with relevant research in topic areas with the aim of deepening personal understanding of all things biological. Issue surrounding natural forms such as behavior, locomotion, adaptation, the environment and systems will also be investigated. We will work in tandem on refining our abilities in communicating what we discover through the process of drawing. A variety of visualization methods will be covered i.e. analytical drawing, visual notes, and diagramming to name a few. We will be using a variety of basic drawing and digital media to develop our work as we uncover aspects of form, structure and surface. Guest speakers will present work they have done in areas such as botany, biology, and environmental studies to name a few. A majority of the work will be done in the field and will then be developed in the studio. A final project will be assigned that will challenge you to develop a concept along with a compelling form(s) that communicates what you have uncovered about nature to a variety of audiences. This course builds on your experiences from First Year drawing and introduces several more advanced visualization methods. This course is intended for Junior and Senior Design Majors.

51-349 Visual Notation/Journaling

Intermittent: 9 units

Visual notation is the graphic equivalent of taking written notes. While the camera is a valuable and at times indispensable tool for recording what we see, the camera cannot make visible mental concepts. Nor can it discover and display underlying structures, create hierarchies, explain organizational schema or concepts that are not easily seen or understood. This course is about making visual notes in order to become fluent in your abilities to observe, record and interperate. Through daily entries in a journal you will work in several content areas i.e. mapping, natural and built environments and systems to name a few. A good portion of the work in this class will be conducted in the field using the resources available to us such as the museum, zoo and architectural sites. You will also be challenged to incorporate your notes as tools for communicating design concepts, implementing project development and presentations. The course will rely on the use of a variety of simple drawing tools and electronic media. Several visualization methods will be introduced and the work will build on the drawing experiences from First Year drawing. This course is intended for Junior and Senior Design Majors.

51-350 Products Studio IV: Designing Products for Social Systems

Spring: 9 units

Challenge students to build their own design and research process to identify and frame the scale and scope of a problem/opportunity, and place it in relation to the wider system (environment, social, cultural contexts); projects will require synthesizing a range of inputs to develop proposals for future working and living.

51-352 Cardboard Modeling II: Exploring expressive product behavior

Intermittent: 6 units

State-of-the-art interactive products express themselves through their screens. This behavior is mostly "digital" in nature. In the human-computer interaction community there are many examples of interaction-styles that offer a more physical/tangible experience. In order to design products that offer such experiences new skills and tools are necessary: not only do we need to explore aspects of expressive form and interaction; we also need to explore expressive (physical) product behavior with an emphasis on sensing and actuating. While there are tools such as arduino, phidgets or gadgeteer available to do this there is little integration with the simultaneous exploration of form. This course aims to offer this integration. This course is open to Industrial Design Juniors, seniors and grads "others" by permission of the instructor. Cardboard Modeling I is a prerequisite, unless approved by the instructor. Materials and tools need to be acquired in advance, a list will be provided; LAB FEE

51-355 Experimental Sketching

Intermittent: 4.5 units

Experimental Forms of Sketching fall 2011 Advancing design drawing philosophy and application This 7 week mini course seeks to expand our experiences with interpreting forms of drawing quality within the process of sketching. This approach will explore semantics of rendering with mixed media, sensitivity of representational perspective, form building, and sequence evolution, within drawing developments that stimulate emotional connections with a viewer. Through exploring and testing variables, we will use the nature of drawing behavior processes to expand the interpretive significance of abstract idea forms. These "drawing idea forms" will be represented throughout a range of abstract levels from literal to highly figurative. Interpretations will derive from a variety of themes involving design, life, and nature and expressed on paper as objects, scenes, and story persuasions.

51-357 Stuff That's Optional: People at Play

Intermittent: 9 units

Stuff that's optional: People at play Unlike our necessary work that provides sustenance for self and dependants, our recreation is optional and chosen. Products that support recreation are, likewise, an option. Soccer balls, kayaks, daypacks, fly reels, chess sets, running shoes; for that matter, the entire recreational industry is based on election. Our lives are better off for it; play is good for us. In this studio/ project course we will investigate play as an aspect of human endeavor. There are readings, discussions, and sessions aimed at gaining an understanding of the field. We will then respond by searching out and framing design opportunities, ideate and propose, refine and test. We will make stuff as teams and individuals that help us further define what it means to be humans at play. This course is intended for Junior and Senior Design Majors.

51-359 Tools for UX Design

Intermittent: 9 units

The course intent is to develop appropriate user experience of tools and technology for a projected time frame or context of use. The need to understand people's stories, their lives, and how they want to live determines what interfaces, products, and systems should be developed. Student teams will work together to create appropriate user interactions and experiences which are supported by the design of tools and/or technology. This integrated course will utilize rapid prototyping as the basis for the creation of these proposed tools and products. This course is intended for junior, senior, graduate level students, Non-Disclosure Agreement and other legal agreements may be part of the requirements. Proficiency in one or more of these visualization methods: freehand sketching, computer visualization in 2D graphics, motion graphics and/or 3D solid or surface modeling. By Instructor Approval if NOT in Design. Please forward statement of intent to Instructor.

51-360 Environments Studio IV: Designing Environments for Social Systems

Spring: 9 units

Develop high fidelity proposals and demonstrations of multi-modal hybridized physical-digital environments based on rich information content and principles of user experience design.

51-363 Environments Studio III: Designing for Complex Environment Systems

Fall: 9 units

Provide a framework and tools for designing for environments using experience design methods as a means to address the plurality of digital/ physical hybrid environments
Prerequisite: 51-265

51-364 Drawing Spaces

Intermittent: 4.5 units

The natural and built environment will comprise the subjects of inquiry in this course. We will investigate systems of spatial and physical organization as found in the landscape in various forms and structures from forest to farm and from tent to tenement as examples. The intersection of these systems found in accessible locals will be investigated in the field through on site drawings using simple media and sketchbooks. These studies will then form the basis for the iteration of more developed images depicting environments both existing and imagined. Some time will be spent on observing people and various life forms as they populate and interact within these spaces to various ends.

51-365 Information & Space

Intermittent: 9 units

In this course, we will take computational approaches to explore information design in space. Students will consider the interactivity and readability of information when creating data-driven systems. They will learn Javascript programming and use P5.js for their interactive systems. There will be three projects: 1) Speech-responsive Kiosk; 2) Immersive Space using Projection; and 3) Data Visualization using Holo Lens. There is no prerequisite for this course, but basic understanding of typography and information design is expected.

51-366 Designing with Community

Intermittent: 9 units

This course will utilize social innovation principles and practices while striving to bring sustainable solutions to a grassroots community space through a series of integrated strategies. The initiative strives to build new types of services and social enterprises by addressing the unmet basic needs of residents. We aim to do that by focusing on the intersection of food, community health, and education. Students will examine Social Design case studies, with a focus on Problem Reframing processes (Dorst), and Solution Amplification (Manzini), and various design-enabled Theories of Change. For the project students will move the vision for Latham St. Commons forward through social experimentation and listening to the needs of an array of people within the neighborhoods of Garfield and Friendship. This type of active participation with the community will help students see the challenges of the community from an insiders point of view, in order for them to design appropriate responses to some of those challenges.

51-367 Computational Design Thinking

Intermittent: 9 units

In this course, we will take computational approaches to consider form, content and context for building design systems with computation. We will take a close look at the relation between input and output, and the effects on user experience on both analog and digital platforms. The aims of the course include learning to use procedural literacy and reflecting on decision-making. Students will integrate Design Thinking and Computational Thinking (CT) to construct conceptual and computational models for communication. They will use Processing and Basil.js for three projects: 1) Generative Typography; 2) Autonomous Poster Machine; and 3) Data-driven Publication. There is no prerequisite for this course, but basic understanding of typography and grid-system is expected.

51-371 Futures

Fall: 9 units

Cover different approaches to interpreting the future: from the extrapolations of trend forecasting, through the risk assessments of scenario planning, to attempts to steering the present through backcasting. Students explore the future through utopian and dystopian fictions that are created by authors, filmmakers and themselves. Students also attempt to evaluate futures in terms of their longer term consequences.

51-372 Persuasion

Spring: 9 units

Examine written argumentation, oral presentations, artifact exhibitions, but also branding and social media. Students learn how to position their design ideas and connect them to the people and organizations that will increase their perceived value to target audiences. A focus of the course is on argument by precedent, where students build the significance of their innovations by situating them historically.

51-373 Design for Good

Intermittent: 9 units

This seminar-in-action will investigate and explore the responsibility of the designer as an agent for social change and development. We will critically examine theoretical readings, case studies, institutions and initiatives from a diversity of interdisciplinary perspectives encompassing economic, socio-cultural, political, ethical, technical and aesthetic factors. These broad survey investigations will then inform the rapid creation of design interventions, artifacts and provocations in response to our collective discoveries. Structured as one seminar and one action lab per week, students will throughout, closely document their thinking and designing in action, as a meta-lens on their own emergent role as a designer, researcher and change-maker.

51-374 Understanding Perception through Design

Intermittent: 9 units

Understanding Perception Through Design 51-374/51774 This course emphasizes audience expectations, also known as schemas, as a major influence on the artifacts we produce. For example, we read marble Corinthian columns as an entrance to a courthouse rather than to a home. The manner we use to communicate, either following or deviating from expectations, affects the way people perceive and process the information we present. Through lectures, discussions, readings, and projects, we will study the use of schemas in both print and digital mediums. We will also explore the bearing of expectations on the types of interactions and experiences we produce, answering the question: Can information become concrete and experiential versus abstract and readerly? Instructor permission required for non-Design majors.

Prerequisites: 51-311 or 51-301

51-375 Meaning in Images

Intermittent: 4.5 units

Images abound in our culture. This course takes a critical look at many different kinds of photographic images to understand how they operate in our culture to inform, persuade, and entertain various audiences. The content for this course will be generated from looking at, thinking about and discussing issues discovered while studying well-known to lesser-known images that range from photographs used in ad campaigns, to photographs that are used in scientific representation, to snapshots in family photo albums, to photographs that are used to show social injustices, to photographs that exist in museum collections. Readings will be assigned and short writing exercises will be required throughout the semester. In addition, photography assignments will be given. Design majors will have preference. Requirement: a digital camera. 15 students, junior and senior Design Majors.

51-376 Semantics & Aesthetics

Intermittent: 4.5 units

The course will explore the principles of visual composition, proportioning systems and the rules of order as it relates to art, architecture and design. The class will involve extensive reading and discussion of these topics in class. Some project work will also be required but minimal to the reading. A reading list will be provided. Instructor permission required for non-Design majors.

51-377 Sensing Environments

Intermittent: 9 units

Whereas UX Design is typically described as shaping the immediate environment between a user and an object/interface, this course will instruct you in techniques, methods, and vocabularies to expand the scale of your design. Course content will give students experience integrating and shaping their current work into 2-3 other levels of scale, such as a single room, building, campus, and neighborhood. Students will walk away with an understanding of environments that will expand their range of capability, fitting for interdisciplinary application within fields such as social innovation, community development, public policy, architecture, and urban design.

51-378 History of the Book and Printing

Intermittent: 6 units

History of Books and Printing 51378 A survey of the materials and techniques used to make books covering manuscripts, calligraphy, printing, presses, type design, readers, illustrators, graphic techniques, and even e-books examined using a variety of tools: real rare books, readings, discussion, in-class exercises, essays & quizzes.

51-379 Information+Interaction+Perception

Intermittent: 9 units

As a society, we're inundated with enormous amounts of dense information on a daily basis. In fact, many of us have grown so accustomed to the abundance of information in our lives that we expect and need it to be accessible virtually anywhere and anytime. Technological advancements, which seem to develop at lightning speed, continuously provide us with tools that make it easy for us to access information quickly. However, little is being done to aid people's understanding of information that is increasing in complexity. Why? Our addiction to accessible and thorough information has caused many of us to turn a blind eye to the perceptual problems associated with its speedy delivery. In this course we will investigate contemporary visualizations of information and the bearing of their forms on the quality of communication. We will also study how peoples' perception of content, interaction with others, belief systems, and mental and physical well being can be affected by the visual communication of information. Thus, although we CAN represent information various ways we will ask how SHOULD it be designed to aid people's understanding of it. Your explorations will take the form of analyses of existing artifacts; class discussions and exercises; short, relevant readings that originate in various disciplines such as cognitive science, architecture, learning science, and design; and corresponding projects that enable you to illustrate what you're learning.

51-380 Experiential Media Design

Intermittent: 9 units

Experiential Media Design focuses on the theory, methodology and history behind the design, development and interpretation of experiential media systems. The class incorporates a multidisciplinary approach to the study of complex media systems as technological, political, economic, socio-cultural and personal experiences. Topics covered include media and communications theory, cultural studies, qualitative and quantitative methodology, design principles, human-computer-interaction, information visualization and representation, user studies and evaluation. Students will create and critique a variety of integrated media systems demonstrating technical competence, aesthetic knowledge, analytic rigor and theoretical relevance. This class is open to Junior & Senior Design Majors, and others by permission of the instructor.

51-382 Introduction to Design for Social Innovation

Intermittent: 4.5 units

This course serves as an introduction to design for social innovation and better prepares students for 51384 Principles & Methods for Design for Social Innovation.

51-383 Topics: Conceptual Models

Intermittent: 9 units

As design problems become more complex, conceptual modeling becomes critical in design process, especially when designing for the abstract concepts such as interaction, experience, service, and systems. Creating conceptual models are often an important step for making the creative leap from user research findings to design implications, which is one of the core challenges in design process. Conceptual models are also effective tool to bring in shared understanding for different stakeholders in teams with multidisciplinary team members, user-participants, and clients. Moreover, these conceptual models often directly lead to final information products to support users to learn how to use complex systems. Conceptual Models is a full semester course that provides students with the opportunity to explore theories related to conceptual models and to improve skills in using them as a means of design. Being primarily developed for graduate and undergraduate students in Design, this course consists of two parts. The seminar part of the course will provide students with readings, examples, and in-class discussions to help them understand the nature of conceptual models. The project part of the course will provide an opportunity to apply these theories to actual projects. Students will work in individuals and teams to create conceptual models for different needs and goals in design process.

51-384 Principles, Approaches & Methods for Social Innovation

Intermittent: 4.5 units

Service, social innovation, transition: all involve engagement with shifting social patterns. This course addresses theory, approaches, methods and skills needed to address social systems challenges, with an emphasis on equipping students for practice. Through a mix of lecture, readings, classroom activities and short projects, the course covers three scales: system, team, and individual. Topics include theories of change, the nature of social system complexity, current approaches and methods for working toward social system shifts, and the skills needed to apply those methods and approaches. Both classroom activities and homework assignments deal not only with the externals of this work, but also with the "inner game" — developing the personal stance and capacities necessary to work in uncertainty, in conflict, and in the midst of sometimes difficult social challenges.

51-385 Design for Service

Intermittent: 9 units

Technology has drastically changed society, and how we design needs to respond, too. Consider the experience of buying shoes. In past decades, before the advent of technology, customers went to a shoe store, were fitted by a clerk, and purchased shoes based on the stock in the store. Fast forward to today, where hundreds of brands and thousands of styles can be browsed online, shipped in 24 hours, and returned if less than perfect for free. The shoe purchase experience relies on system of services and products to satisfy one's needs and desires for new shoes. In this course, we will collectively define and study services and product service systems, and learn the basics of designing them. We will do this through lectures, studio projects, and verbal and written exposition. Classwork will be done individually and in teams. In some instances, we work with an external client to re-envision their core service offering.

51-387 Introduction to DeXign Futures

Intermittent: 9 units

As corporations, governmental organizations, and civil associations face accelerating change in uncertain times, increasingly they are looking to designers for new ways of thinking and acting. Designers today are engaged as thought leaders, strategists, activists, and agents of change in complex socio-technical problems throughout private, public, civil and philanthropic sectors worldwide. For designers trained to shape futures defined by uncertainty and change, these exponential times represent unprecedented creative opportunities for innovation. In this course, students learn the basic design skills necessary explore the forces that drive change in the future and learn to align innovation strategically with the trajectories of those forces.

51-388 Sharing Economies

Intermittent: 9 units

This topic course explores the nature and practice of sharing. The course is a survey of cultural theories about why and how we do and don't share and the difference design can make to systems of sharing. It explores philosophies and anthropologies of sharing, distinguishing sharing from giving, lending and exchanging. It interrogates psychologies and histories of ownership, and notions of privacy. The course also explores the range of new systems that promote sharing in the contexts of the new sociality enabled by the social media and cosmopolitan urban living. It investigates the role of politics, such as concerns about ecological sustainability, and the role of perceived autonomy and convenience. By the end of the course, you will have a more comprehensive understanding of what facilitates and constrains sharing, and so be in a better position to design systems that promote increased resource productivity. Open to Sophomore - Graduate from across the university - no prior design capacities necessary, though they will help.

51-390 Social Interaction Design in Community

Intermittent: 9 units

The course looks at Design for Social Innovation principles and practices, Documentary Photography, and Design Research while walking the streets, talking to residents, and working with organizations in a Pittsburgh neighborhood to understand its challenges. Students will examine Social Design case studies, with a focus on Problem Reframing processes (Dorst), and Solution Amplification (Manzini), and various design-enabled Theories of Change. They will also explore histories and theories of Documentary Photography. For the project/ethnographic portion of the class, students will work in teams of two within a neighborhood, and partner with residents and organizations. These collaborations will help students see the challenges of the community from an insiders point of view, in order for them to design appropriate responses to some of those challenges.

51-392 Images and Communication

Intermittent: 4.5 units

No one doubts the value of photography as a means of recording life. Even if we don't think of ourselves as photographers, digital cameras make it easy to photograph our families, our trips, and aspects of our life that we want to remember. But beyond snapshots, can photography also teach us how to see? And how do they teach us about the world? And, what are the qualities inherent in photographs that make them effective as artifacts of communication? Does looking through the camera's viewfinder sensitize us to world and help us see more? Or, as some writers suggest, does the camera interfere with experiencing the world fully. This course explores seeing with the camera and the many issues that arise when one snaps the shutter. We will be looking at a range of different kinds of photographic images, understanding their contexts, and how to read them. Designers and other visual people use photographs extensively in their work. This course endeavors to make students more aware of their decisions and actions when making photographs as well as how to judge a photograph's effectiveness. The issues that we discuss using photographs, relate to other kinds of visual images, as well. We will be making photographs as we are discussing critical issues in photography that come out of readings. Students must own a digital camera but no prior photographic experience is necessary.

51-393 Object Lessons: Design History at the Museum

Intermittent: 4.5 units

Students meet with the Design Curator at the Carnegie Museum of Art to examine and discuss designed objects.

51-396 Design Ethos & Action

Intermittent: 9 units

Increasingly, designers have the potential to operate as agents of change in a broad range of areas including corporate, government, non-profit, social innovation start-ups, and sustainability projects. With so much choice on the horizon, some designers may wonder, What value do I bring to the world through design? Values often are implicit and may vary across contexts (e.g., profit, efficiency, effectiveness, fairness, social impact, environmental impact). This course focuses on exploring and identifying the potential for positive and negative impact that design can have in the world around us. For example, how might a designer embed values related to sustainability, gender equality, or race relations into his or her design projects and design practice?

51-399 Junior Independent Study

All Semesters

Guidelines for independent study in the Design office. Proposals must be approved by faculty before registration.

51-401 Senior Design Lab

Fall: 12 units

The Fall semester senior year focuses on design agility and helping students develop new ways of addressing the complexity of design problems. Through a series of three independent labs, students explore three kinds of designerly behaviors - wondering, playing, and speaking. These behaviors are not methods to be learned; they are ways of being agile as a designer that frees and empowers you to be both creative and responsive to the situations in which you are working. These labs serve as the requisite precursor to the Spring capstone project. This course is reserved for senior Design majors only.

51-403 Independent Senior Project n

Fall: 12 units

The senior year offers Design majors the opportunity to explore a variety of advanced topics through project-oriented courses. These project courses typically require an integration of skills and knowledge gained throughout the entire design program. Senior projects are often funded by outside companies or organizations, providing real world clients. This project highlights the role that visual interface designers play in the multi-disciplinary attempt to bridge the gap between functionality and usability and to introduce students to some of the unique challenges of designing within the realm of a digital, interactive medium.

51-404 Senior Project

Spring: 12 units

The senior year offers Design majors the opportunity to explore a variety of advanced topics through project-oriented courses. These project courses typically require an integration of skills and knowledge gained throughout the entire design program. Senior projects are sometimes funded by outside companies or community organizations, providing real world experiences.

51-405 Senior Project: Communication Design

Fall: 12 units

The senior year offers Design majors the opportunity to explore a variety of advanced topics through project-oriented courses. These project courses typically require an integration of skills and knowledge gained throughout the entire design program. Senior projects are often funded by outside companies or organizations, providing real world clients. This project varies from one semester to the next, providing various opportunities in areas such as exhibit design, branding, and web design.

51-406 Senior Project II

Spring: 12 units

The senior year offers Design majors the opportunity to explore a variety of advanced topics through project-oriented courses. These project courses typically require an integration of skills and knowledge gained throughout the entire design program. Senior projects are often funded by outside companies or organizations, providing real world clients.

51-407 Senior Project: Social Impact by Design

Fall: 12 units

The senior year offers Design majors the opportunity to explore a variety of advanced topics through project-oriented courses. These project courses typically require an integration of skills and knowledge gained throughout the entire design program. Senior projects are often funded by outside companies or organizations, providing real world clients. This project focuses on new product development.

51-414 Senior Project III (IPD)

Spring: 12 units

This course provides an integrated perspective on the many processes by which new products are designed, manufactured, and marketed. Under the direction of faculty from Design, Engineering, and Industrial Administration, students will work together in interdisciplinary groups on the development of real products. In addition to the product development project, the course includes lectures on innovation strategy, opportunity identification, designing products, object representation and manufacturability rules, computer-assisted design and prototyping, concept testing and protocol analysis, redesign issues, market testing, manufacturing and production, and product introduction and management. Open to graduate and senior-level engineering students, industrial administration students, and design students.

51-421 Basic Interaction Design

Fall: 9 units

This course highlights the role that visual interface designers play in the multi-disciplinary attempt to bridge the gap between functionality and usability and to introduce students to some of the unique challenges of designing within the realm of a digital, interactive medium.

51-422 Interaction Design Studio

Spring: 9 units

Intended for HCI double majors, this is the spring offering of 51-421 Introduction to visual interface design. This course highlights the role that visual interface designers play in the multi-disciplinary attempt to bridge the gap between functionality and usability and to introduce students to some of the unique challenges of designing within the realm of a digital, interactive medium.

51-423 Pieces 2.0: Social Innovation: Desis Lab

Intermittent: 9 units

In this class, students will identify a social problem and take a holistic design approach to solving it. They will design a product/product line—anything from a set of tools to help older adults lead a more active lifestyle, to re-envisioned collateral for the Lupus Foundation Pennsylvania. After or in tandem with the creation of this product, the student will construct an image, which will entail print media, a Web presence, packaging, and photography. By creating the product and its "marketing" effort from top-to-bottom, the student will gain a diverse set of skills in design as well as a richer understanding of the product. In the end, all the pieces will come together to create a well-refined image.

51-424 Web Portfolio

Intermittent: 4.5 units

This course will provide an opportunity for students to design and code their online portfolio. The course covers basic elements of Web design along with the foundations of HTML, CSS, Javascript and Flash as components of the design process. Prior experience with HTML is encouraged but tutorials will be provided if necessary. This is not an Actionscript programming course.

51-425 Beginning Book Arts Lab

Fall and Spring: 6 units

Beginning Book Arts Lab Class. 6units. (This class is a prerequisite for the Advanced Book Arts Workshop Lab Class). This is a class of basic issues regarding hand bookbinding and letterpress printing. It's purpose is to develop a basic structural sense of book forms, of flat format work and of three dimensional forms. Learning hand craft techniques, developing hand skills and the sensitivity to materials are also a goal. Binding projects assigned will target the unique nature of papers, fabrics and archival card-boards. Structural procedures and techniques will be identified with each assigned binding project. The binding projects will be: A hardcover for a paper back book, a single signature book, a multi-signature book with flat spine, and a box construction. The box project is designed and crafted to contain a small letterpress printed class edition, either in book form, or as a set of un-bound pages. The letterpress component teaches the standard issues, unique to the relief process, in press work, handset procedure of cast metal type, page form spacing, lock-up of pages in press, proofing, and production printing. Each semester a small class edition project of text content and image, in two-color registration, is designed, hand set and printed. Image generation can be by hand cut block, assembled type-high forms, or digital process to polymer plate. This class is not to be repeated.

51-426 Beginning Book Arts Lab

Spring: 6 units

Beginning Book Arts Lab Class. 6units. (This class is a prerequisite for the Advanced Book Arts Workshop Lab Class). This is a class of basic issues regarding hand bookbinding and letterpress printing. It's purpose is to develop a basic structural sense of book forms, of flat format work and of three dimensional forms. Learning hand craft techniques, developing hand skills and the sensitivity to materials are also a goal. Binding projects assigned will target the unique nature of papers, fabrics and archival card-boards. Structural procedures and techniques will be identified with each assigned binding project. The binding projects will be: A hardcover for a paper back book, a single signature book, a multi-signature book with flat spine, and a box construction. The box project is designed and crafted to contain a small letterpress printed class edition, either in book form, or as a set of un-bound pages. The letterpress component teaches the standard issues, unique to the relief process, in press work, handset procedure of cast metal type, page form spacing, lock-up of pages in press, proofing, and production printing. Each semester a small class edition project of text content and image, in two-color registration, is designed, hand set and printed. Image generation can be by hand cut block, assembled type-high forms, or digital process to polymer plate. This class is not to be repeated.

51-427 Advanced Book Arts Workshop

Intermittent: 9 units

Students will be required to plan and design projects that relate to binding, or digital printing, or letterpress printing, or hand-setting of cast metal type. Projects utilizing a combination of all processes can be planned as well. Experimental work, or Artists' Books are also encouraged. In this class structure students will be able to plan and design projects that are complete books, with printed content, or with out content. Other flat structures, and three dimensional containers are examples of general forms that will be categorized as binding work. Students who wish to enroll in this course must have already taken Beginning Book Arts, and must also speak to the instructor directly about project ideas. Emphasis for binding is working independently with a greater level of hand craft and a sensitivity to materials. Emphasis for letterpress printing is to learn in depth, and master, the general mechanical process for doing press work. Emphasis for hand typesetting is on gaining an understanding of the system of cast metal type, and to develop a sensitivity to typographic principles. Instruction will be given on an individual basis through consultation at strategic times throughout the semester. Project evaluation will be based on the success of the project work compared to each student's written project proposal at the start of the semester. The Advanced Workshop in Book Arts can be repeated. For more complex project work this class can be continued for the following semester.

Prerequisites: 51-426 or 51-425

51-428 Time, Motion and Communication

Intermittent: 9 units

This course focuses on designing and presenting time-based messages on screen. The differences between paper-based and screen-based communication are discussed and become departure points for projects. Working with word, image, sound, and motion — in Adobe AfterEffects — students develop responses to a variety of project briefs. Brief histories of animation, experimental films, and title sequences, as well as experimental music provide conceptual models to our discussions. An attitude of exploration is stressed, with an emphasis on visual voice, performance, and communication. Content will include personal messages and timely information. Proficiency with AfterEffects is a firm requirement. Preference will be given to junior and senior Design students.

51-431 Revealing Place

Intermittent: 9 units

Revealing Place is a documentary photography class where students will use their cameras to explore a group, idea, and/or location and tell its story. Students will use photography as a way to engage community, document social phenomenon, and define what's happening at that moment in the history of their chosen setting.

51-434 Experimental Form

Intermittent: 9 units

The Experimental Form Studio looks broadly at the discipline of industrial design with an emphasis on creating new paradigms for interactive objects. This course encourages an exploratory study of physical objects and artifacts and provides a creative and intellectual forum to re-imagine our relationship with objects. Each independently-themed project presents opportunities to consider embedded mechanics & technology, objects as interactive media, and experience-driven design. Experimental Form, at its most basic, is a process that blends play and inquiry in an open-ended way finding the unexpected through tinkering and trying something you don't quite know how to do, guided by imagination and curiosity. In this sense, Experimental Form complements the core ID Studio sequence by providing a playground for intellectual discourse, experimental trial and error, and refining individual processes for designing. This is your sandbox. Prerequisites: Junior standing in industrial design. Junior level communication design with instructor permission. Prerequisites: 51-248 or 51-343 or 51-311

51-435 Presentation & Pitch Design

Intermittent: 4.5 units

Presentation & Pitch Design: The premise of the course is to provide design students with the fundamental tools to effectively present and pitch their designs. The foundation of the course is best explained by Dick Buchanan he states, "The designer, instead of simply making an object or thing, is actually creating a persuasive argument that comes to life whenever a user considers or uses a product as a means to some end." (Buchanan, R. 1985) I am looking to enter into a dialogue with undergraduate and graduate design students based on the notion of creating a "persuasive argument" to their design presentations. More importantly, I am looking to facilitate skill development using narratives as a medium for design students to present and pitch the intent of their designs based on five core principles. intentional positioning (empathize with your audience) restraint in preparation (concise structure) simplicity in design (visual congruence with design artifact) clarity in rhetoric (know your message) naturalness in delivery (be yourself) Upon completion of this class, students will have mastery in the Five Core Principles mentioned. They will be able to: Identify and cater to their audience's needs Empathize with their audience and adjust accordingly Craft a narrative that captures their design intention(s) Visually compliment their design in their presentation Clearly develop their message (pitch) Develop and present in their own style

51-439 Design for Service Studio

Intermittent: 9 units

Services constitute more than 79.2% of the US economy. The service sector has been increasing substantially while the commodities and manufacturing sectors have experienced a steep decline. Yet, service providers have historically under-utilized design in its business strategy and development. During this project course, intended to work in conjunction with Designing for Service Seminar, we will extend the idea of design as more than aesthetics and provide the opportunity for students to practice embodying its perspective and process, mapping design theory to project process. Students will spend the semester in teams, working with the Pittsburgh Post-Gazette to deeply understand their users and stakeholder's experiences, needs, and desires. We will explore the role of journalism and news in society, the volatile sector as a whole, and the challenges facing newspapers in America. The human-centered design approach will employ ethnographic research methods, allowing for teams to uncover insights and observations about patterns. Students will in turn learn to synthesize these findings into appropriate models, prototype concepts, and look for opportunities. The design solutions are intended to inform elements of the paper's competitiveness, creativity, development and future service innovations. The final deliverable will be refined solutions as illustrated in a presentation and process document.

51-441 Foundation of BME Design

Fall: 6 units

This course focuses on the Product Development scope and framing of a new medical device. Students will work together in an interdisciplinary team with Biomedical Engineering students to identify medical professional or patient needs through behavioral research and participatory research methods. This course deliverable requires the team to propose the problem space and develop a design brief and plan for the following Spring semester to implement. Prerequisite: Junior level design or higher with studio training. Solid modeling or surface modeling recommended.

51-442 BME Design Project

Spring: 9 units

This course is the second in sequence of prototyping and testing a proposed medical device product. The course consists of modules for the development of a project plan, background research, hazard analysis, setting product specifications based on user requirements, detailed design and analysis, prototype development and final documentation and presentation. All products developed will respond to the needs of appropriate market segments; resulting products will be deemed safe, effective, useful, usable and desirable by those segments. Students will produce a form model, functional prototype, marketing plan, and manufacturing plan of their product. Prerequisite: 51-441 (3 units, Fall) Foundations of Biomedical Engineering Design (or permission of the instructor). Junior level design or higher with studio training. Solid modeling or surface modeling recommended.

51-451 Fundamentals of Joinery & Furniture Design

Fall: 9 units

Intensive introduction to traditional joinery techniques and the properties of wood through the use of textbook studies and lab experiments. Emphasis placed on how these techniques and properties influence design decisions. Students will learn how to set up, sharpen and use traditional hand powered tools. This acquired knowledge will be applied in the design and realization of a piece of wooden furniture. Limited enrollment. Lab fee and material purchases required.

51-452 Furniture Design II

Spring: 9 units

A continuation of 51-451, this course explores a much broader range of issues related to furniture design. Students will identify and define in a proposal the area of furniture design they intend to investigate and then produce one or more furniture pieces developed from their findings. Materials and processes applied to the project are limited only by the resources the student can bring to bear. Assigned readings and a series of in-class discussions will focus on the influence of workmanship in design, and on how the behavior of the user is influenced by the form or esthetic language of the artifact. Lab fee & material purchases required. Prerequisite: 51-451

51-455 DeXign the Future: Human Centered Innovation for Exponential Times

Intermittent: 9 units

DEXIGN THE FUTURE: Human Centered Innovation for Exponential Times As corporations, governmental organizations, and civil associations face accelerating change in uncertain times, increasingly they are looking to designers for new ways of thinking and acting. Designers today are engaged as thought leaders, strategists, activists, and agents of change in complex socio-technical problems throughout private, public, civil and philanthropic sectors worldwide. For designers trained to shape futures defined by uncertainty and change, these exponential times represent unprecedented creative opportunities for innovation. In this course, students explore methods and tools for design in exponential times to shape uncertain futures. Students will explore the forces that drive change in the future (i.e., social, economic, political, environmental, technological), and learn to align innovation strategically with the trajectories of those forces. The design project that drives everything else is the future of mega-metropolitan regions, the hubs of innovation where 70% of people in the world and 75% of Americans will live in 2050. In the semester long project, students create scenarios for Life 2050 in Metro 3.0, using Pittsburgh as a locus and focusing on a project within urban systems such as Sustainable Production & Consumption, Lifelong Learning, Human Development and Resilient Community.

51-471 Practicing Design

Fall: 9 units

This is a lecture course covering all aspects of design practice. Students learn to formulate a plan for professional practice, market creative services, manage projects, and understand the legal and ethical issues associated with design practice. This course will also address the changing role of the design professions. Visiting professionals, case studies, and supplementary readings provide resources for class discussion. This course is required for all senior design majors.

51-478 Speculative Critical Design

Intermittent: 9 units

This praxis-based course will actively engage futures research through the integration of findings from critical readings, ethnographic research, mediated storytelling and hybrid prototyping. Using techniques of inversion, defamiliarization, uncertainty scenarios, everyday practice and good old-fashioned humor, we will create objects, systems and experiences that stimulate conversation, debate and understanding. The course seeks to produce a diversity of 'what will?' and 'what if?' cultural provocations that deeply examine possible, unwanted and seductive futures. This course is open to Junior and Senior Design majors, or by permission of the instructor.

51-479 Design for Improved Understanding of Health Information

Intermittent: 9 units

During the course students will use a design framework and proven methodologies to create health communications that aid low health literate individuals to better understand their role in the system of care, evaluate where, when and how to access care and communicate with peers and experts when they need help. Students will work closely with the Regional Health Literacy Coalition and various social institutions to insure relevance, context, and access.

51-480 Design Capstone Project: Service Design

Spring: 4.5 units

Learn how to work independently, applying skills/knowledge in Products, Communications, Environments to the research/definition/development/testing of a project that focuses on the design of a service that warrants investigation; deepen understanding of service design principles and how they are put into practice.

51-481 Design Research Studio

Fall: 12 units

Learn how to work with a group of designers, applying skills/knowledge in Products, Communications, Environments to the research/definition/development/testing of a project that focuses on the design of a service that warrants investigation; gain an understanding of service design & design for social innovation principles and how they are put into practice; learn how to manage a semester-long project, preferably working with a local client.

51-483 Debating the Roles & Responsibilities of the Designer

Intermittent: 9 units

Designers are expected to play a role in creating aspirational lifestyles through products and services, and informing and influencing human behavior on small and large scales. However what impact does or should the designer have on our lives, our society, and culture? Through readings, discussions, and team activity, students will construct pro and con arguments and debate the role and responsibility of the designer in a critical and fun way.

51-486 Learner Experience Design

Intermittent: 9 units

This course focuses on designing experiences that engage people in educational activities that enhance their learning through meaningful, memorable, and enjoyable interactions with information. Throughout the course, students investigate the intersection of design thinking, UI/UX design, cognitive studies, social sciences, instructional design, and educational pedagogy as a way of developing knowledge and skills in designing experiences for learners. Students study topics that are often difficult to grasp and collaboratively build a taxonomy of content types based on common and differentiating characteristics to identify design opportunities. Through readings, projects, and class exercises, students explore how people perceive and process information, what motivates them to learn, and what constitutes an experience. The course introduces students to traditional and emergent learning tools and methods as a means of defining affordances and limitations of various learning approaches and mediums. It also provides students the opportunity to apply what they learn through the design, testing, and assessment of learning experiences that they create.

51-490 Design Capstone Project: Social Innovation

Spring

Learn how to work independently, applying skills/knowledge in Products, Communications, Environments to the research/definition/development/testing of a project that focuses on the design of social innovation that warrants investigation; deepen understanding of social innovation design principles and how they are put into practice.

51-491 Design Research Studio: Designing for Social Innovation

Fall: 12 units

Learn how to work with a group of designers, applying skills/knowledge in Products, Communications, Environments to the research/definition/development/testing of a project that focuses on design of a social innovation that warrants investigation; gain an understanding of social innovation design principles and how they are put into practice; learn how to manage a semester-long project, preferably working with a local client.

51-499 Senior Independent Study

All Semesters

Guidelines for independent study in the Design Office. Proposals must be approved by faculty before pre-registration.

51-667 Computational Design Thinking

Fall and Spring: 12 units

In this course, we will take computational approaches to consider form, content and context for building design systems with computation. We will take a close look at the relation between input and output, and the effects on user experience on both analog and digital platforms. The aims of the course include learning to use procedural literacy and reflecting on decision-making. Students will integrate Design Thinking and Computational Thinking (CT) to construct conceptual and computational models for communication. They will use Processing and Basil.js for three projects: 1) Generative Typography; 2) Autonomous Poster Machine; and 3) Data-driven Publication. There is no prerequisite for this course, but basic understanding of typography and grid-system is expected.

51-880 Experiential Media Design

Intermittent: 12 units

Experiential Media Design focuses on the theory, methodology and history behind the design, development and interpretation of experiential media systems. The class incorporates a multidisciplinary approach to the study of complex media systems as technological, political, economic, socio-cultural and personal experiences. Topics covered include media and communications theory, cultural studies, qualitative and quantitative methodology, design principles, human-computer-interaction, information visualization and representation, user studies and evaluation. Students will create and critique a variety of integrated media systems demonstrating technical competence, aesthetic knowledge, analytic rigor and theoretical relevance