

SCHOOL OF HUMAN ECOLOGY

design studies department

DS 220 DESIGN FUNDAMENTALS: TWO

Spring 2016

SYLLABUS AND POLICIES

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Catalog Description: 220 - Design Fundamentals II - Three-Dimensional Design. I, II, 3 cr. Elements and principles of three-dimensional design. Lecture and studio experience relevant to design and analysis of the spatial environment.

Prerequisites: DS 120, Design Fundamentals I and Mechanical Engineering 160 or Art 112.

Course Rationale: This course will focus on space, form and materials as the components of the three-dimensional environment. Space and form are considered along with the factors which affect how they are perceived by people. Students will work with design elements and principles to develop three-dimensional solutions to abstract and real world problems. Solutions will be expressed as drawings, simple constructions, and more detailed models. Stimulation of creativity in problem solving is approached through examination of thinking processes and visual thinking techniques. Field trips will be involved.

Course Objectives:

1. To understand the differences between two- and three-dimensional design.
2. To understand the factors that affect how spaces and forms are perceived and evaluated.
3. To develop the ability to analyze and evaluate three-dimensional designs using aesthetic and functional criteria.
4. To develop the ability to manipulate design elements and apply design principles to create new designs or solve abstract and functional design problems.
5. To understand of shape, size/proportion, color, texture and pattern as visual elements of three-dimensional design and how they can be used to achieve intended design outcomes.
6. To understand conceptual, constructional and relational elements of three-dimensional designs and the ordering systems that define physical structure and spatial relationships.
7. To gain an understanding of the physical, aesthetic, and practical properties and qualities by which materials vary, and which serve as criteria for their application to a design situation.
8. To apply design methods and gain an understanding of the visual thinking strategies that will produce more creative and successful solutions to design problems.
9. To develop the ability to express three-dimensional designs in both two- and three-dimensional visual formats for purposes of conceptualizing, developing, and communicating ideas.

Required Text: Ching, Francis d. K., **Architecture: Form, Space & Order**, 4th ed. New York: Van Nostrand Reinhold, 2007.

Other Useful References:

1. Block, Jonathan & Jerry Leisure, Understanding Three Dimensions. Englewood Cliffs, NJ: Prentice-Hall, 1987.
2. Hannah, Gail Greet, Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships, New York: Princeton Architectural Press, 2002
3. Elam, Kimberly, Geometry of Design. NY: Princeton Architectural Press, 2001.
4. Leborg, Christian, Visual Grammar. NY: Princeton Architectural Press, 2008.
5. Linton, Harold, Color Model Environments, Color and Light in Three-Dimensional Design. NY: Van Nostrand Reinhold Co., 1985.
6. Sutherland, Martha, A Basic Guide – Modelmaking. NY: W.W. Norton & Company, Inc., 1999.
7. Wong, Wucius, Principles of Form and Design. NY: Van Nostrand Reinhold Co., 1993.

Class Activities, Policies, and Procedures:

1. **Lectures/Readings** are sequenced to prepare students for studio projects.
2. **Studio Projects and Exercises** require a demonstration of the ability to apply course concepts and information.
3. **Project Progress** from one studio to the next is expected and requires significant and regular time investment outside of class.
4. **Critiques and working in studio** are essential learning activities.
5. **Attendance is required**; come prepared with all necessary tools and materials.
6. **Short Papers and/or Quizzes** are designed to stimulate creative thinking and incorporate new terms and vocabulary.

Grading:

Points:

| | |
|--|-------------|
| 1. Warm Up Construction Exercises | 30 |
| 2. With-in Grasp | 60 |
| 3. Gallery Construction (teams of three) | 80 |
| 4. Functional Art | 100 |
| 5. Cardboard Structures (teams of three) | 150 |
| 6. Tiny House Project | 200 |
| 7. Two Tests | 160 |
| 8. Journal entries and presentations (6) | 60 |
| 9. TED Talks (6) | 60 |
| 10. Attendance – Lecture and Lab | 100 |
| Total Possible Points: | 1000 points |

Note: Attending lecture and working effectively in class are important. Each lecture and studio will earn you two points. One point is deducted if you are late. You can make up two absences (excused and unexcused by attending a Wright Lecture or watching a Ted talk).

Note: Lecture dates are subject to change to accommodate field trips/guest speakers or adjustments in project timelines.

Note: Lecture notes will be posted on Learn@uw before each quiz.

Project Evaluations/Grades will address all relevant project components which may include Programming and Concept Development Sketches, the Design Solution, and Visual and Written Documentation. Professional, quality craftsmanship is expected and is important to successful communication and professional credibility.

Special Needs? I wish to fully include persons with special needs in this course. Please let me know if you require any special accommodations in the curriculum, instruction or assessments of this course to enable you to fully participate. Confidentiality of any information shared with me will be respected.

UW Policy states that: *Students must inform the instructor of need for accommodation of any special needs (recognized disabilities, absences for athletic meets, etc.) by the end of the second week of class. Students must also inform the instructor in advance of days they will be absent for religious holidays. Instructors will try to make reasonable accommodations in accordance with university policies.* Please let me know should something unexpected arise during the course of the semester.

Grade Reduction for unexcused late projects depends on the number of days late, knowledge of progress, and thoroughness of the work. Projects more than 7 days late will not be accepted for grading. The final project may not be more than 3 days late in order to meet UW deadlines for filing final grades. Requests for project extensions should be discussed with instructor prior to the due date.

Exercises, Attendance, Observable Effort and Growth:

- a. Attendance (one unexcused studio absence allowed; inform of health emergencies at time of event)
- b. Effective use of lab time (prepared to work and making progress on projects/assignments)
- c. Prepared for and participate in group discussions, presentations, and critiques.
- d. Evidence of effort to apply criticism and improve across the semester.

Grading Scale:

100 – 95% A = Exceptional Quality

94 – 90% AB = Very Good Quality

89 – 85% B and 84 – 80% BC = Good Quality

79 – 75% C and 74 – 70% CD = Satisfactory but Lower Quality

69 – 65% D or F = Unsatisfactory quality or incomplete solution

General Operation Procedures:

1. Academic honesty and high standards are expected of all students
2. Projects must meet specified format requirements (i.e. size/binding, labeling, etc.) or may be returned for modifications prior to grading
3. Students are responsible for obtaining information or announcements missed due to late arrival or absence.
4. It is not appropriate to schedule work or other appointments during class time
5. Make-up exams and grades of incomplete are given subject to UW policies and procedures, including informing instructor of need in advance.

There are many services on campus that can help students that are having difficulty.

Here are a few helpful links to useful resources:

1. Master list of student services available at: www.wisc.edu/studentlife/studnetservices.php
2. University Health Service: www.wisc.edu/homejsp?catid=36
3. GUTS (Greater University Tutoring Service) www.guts.studentorg.wisc.edu/index.asp
4. Tutoring help and other assistance in SOHE classes through SOHE Student Affairs Office, 262-2608

LECTURE/STUDIO SCHEDULE

| WEEK | DATE | TOPIC | CLASS PREP |
|------|-----------------|---|---|
| 1 | Jan. 19 (T) | Lecture/Studio: Course Introduction and Ted Talk - Tim Brown “ Creativity and Play” <ul style="list-style-type: none"> • Introduction to projects and materials • Assign Construction Exercise (due 1/28) | |
| | Jan. 21 (TH) | Studio: <ul style="list-style-type: none"> • Work on Construction Exercise • TED talk 1 due on line | <ul style="list-style-type: none"> • Bring construction supplies • Submit TED talk reflection into dropbox (due before class) |
| 2 | Jan. 26 (T) | Lecture/Discussion: Drawing types and uses, Abstract to Concrete Graphic Languages. Studio: <ul style="list-style-type: none"> • Work on construction exercises | <ul style="list-style-type: none"> • Read: pp. 1-31 • Make progress on exercises |
| | Jan. 28 (TH) | Studio: <ul style="list-style-type: none"> • Construction Exercise Due • Assign With-in Grasp (due 2/16) • Journal Entry 1 due – present in small groups | <ul style="list-style-type: none"> • Work on journal entry • Complete construction exercise • Read With-in Grasp project |
| 3 | Feb. 2 (T) | Lecture/Discussion: The Structure of Visual Relationships and the form/space dynamic. Studio: <ul style="list-style-type: none"> • Work on With-in Grasp | <ul style="list-style-type: none"> • Read: pp. 33-73, 93-102 • Bring in sketches |
| | Feb. 4 (TH) | Studio: <ul style="list-style-type: none"> • Work on With-in Grasp • TED talk 2 due on line | <ul style="list-style-type: none"> • Bring in refined sketch • Submit TED talk reflection into dropbox (due before class) |
| 4 | Feb. 9 (T) | Lecture/Discussion: NO LECTURE Studio: <ul style="list-style-type: none"> • Work on With-in Grasp | |
| | Feb. 11 (TH) | Studio: <ul style="list-style-type: none"> • Work on With-in Grasp • Journal Entry 2 due – present in small groups | <ul style="list-style-type: none"> • Work on journal entry |
| 5 | Feb. 16 (T) | Lecture/Discussion: Articulation of Form and Ordering Principles <ul style="list-style-type: none"> • With-in Grasp Due • Assign Gallery Project (due 3/3) • Measure the Gallery | <ul style="list-style-type: none"> • Read: pp. 80-91, 337-405 • Read: Gallery Project Assignment • Complete With-in Grasp |
| | Feb. 18 (TH) | Studio: <ul style="list-style-type: none"> ▪ Work on the Gallery Project ▪ TED talk 3 due on line | <ul style="list-style-type: none"> • Bring in ideas for gallery • Submit TED talk reflection into dropbox (due before class) |
| 6 | Feb 23 (T) | Lecture/Discussion: Visual Properties of Texture & Shape Studio: <ul style="list-style-type: none"> ▪ Work on the Gallery Project | <ul style="list-style-type: none"> • Complete gallery model • Have developed theme • Select two textiles for HLAC collection |
| | Feb. 25 (TH) | Studio: <ul style="list-style-type: none"> ▪ Work on the Gallery Project ▪ Journal Entry 3 due – present in small groups | <ul style="list-style-type: none"> • Work on journal entry |

| | | | |
|----|------------------|--|--|
| 7 | March 1 (T) | Lecture/Discussion: Visual Properties of Size & Proportion. Studio: <ul style="list-style-type: none"> • Work on the Gallery Project | <ul style="list-style-type: none"> • Read: pp. 294-333 |
| | March 3 (TH) | Studio: <ul style="list-style-type: none"> • TED talk 4 due on line • Gallery Project Due • Assign Function Art Project (Due March 17th) • View textile from HLAC for next project | <ul style="list-style-type: none"> • Read: Functional Art Project • Complete Gallery Project • Submit TED talk reflection into dropbox (due before class) |
| 8 | March 8 (T) | Lecture/Discussion: Visual Property of Color Studio: <ul style="list-style-type: none"> • Work on Function Art Project | <ul style="list-style-type: none"> • ON LINE Quiz (Due 3/10 10 pm) • Bring in concept sketches |
| | March 10 (TH) | Studio: <ul style="list-style-type: none"> • Work on Function Art Project • Journal Entry 4 due – present in small groups | <ul style="list-style-type: none"> • Work on Journal entry • Bring in refined design |
| 9 | March 15 (T) | Lecture/Discussion: Applied Design Problem Solving Studio: <ul style="list-style-type: none"> • Work on Function Art Project | <ul style="list-style-type: none"> • Bring in completed drawings |
| | March 17 (TH) | Studio: <ul style="list-style-type: none"> • Function Art Project Due • Assign Cardboard Project (Due 4/29) • TED talk 5 due on line | <ul style="list-style-type: none"> • Read: Cardboard Project • Complete Functional Art • Submit TED talk reflection into dropbox (due before class) |
| 10 | | Spring Break! March 19 – 27 | |
| 11 | March 29 (T) | Lecture/Discussion: Design Thinking Studio: <ul style="list-style-type: none"> • Design Thinking experience | |
| | March 31 (TH) | Studio: <ul style="list-style-type: none"> • Interview Clients • Journal Entry 5 due – present in small groups | <ul style="list-style-type: none"> • Work on Journal entry • Bring in interview questions |
| 12 | April 5 (T) | Lecture/Discussion: Furniture and Detailing Studio: <ul style="list-style-type: none"> • Work on Cardboard Structure | <ul style="list-style-type: none"> • Bring in concept sketches |
| | April 7 (TH) | Studio: <ul style="list-style-type: none"> • Work on Cardboard Structure • TED talk 6 due | <ul style="list-style-type: none"> • Bring in Prototypes • Submit TED talk reflection into dropbox (due before class) |
| 13 | April 12 (T) | Lecture/Discussion: Methods of Relating Spatial Volumes/Enclosures and circulation Studio: <ul style="list-style-type: none"> • Work on Cardboard Structure | <ul style="list-style-type: none"> • Read: pp. 103 - 291 • Refine selected prototype drawings • Prepare for Construction |
| | April 14 (TH) | Studio: <ul style="list-style-type: none"> • Work on Cardboard Structure • Journal Entry 6 due – present in small groups | <ul style="list-style-type: none"> • Work on Journal entry |
| 14 | April 19 (T) | Lecture/Discussion: Sketchup training Studio: <ul style="list-style-type: none"> • Cardboard Structure Due • Assign Tiny House/disaster relief shelter | <ul style="list-style-type: none"> • Read: Tiny House Project • Complete Cardboard Structure |
| | April 21 (TH) | Studio: <ul style="list-style-type: none"> • Work on Tiny House/disaster relief shelter | <ul style="list-style-type: none"> • Bring in research |

| | | | |
|----|------------------|--|---|
| 15 | April 26 (T) | Lecture/Discussion: Sketchup training Studio: <ul style="list-style-type: none"> • Work on Tiny House/disaster relief shelter • On Line Final Test Available | <ul style="list-style-type: none"> • Bring in concept sketches |
| | April 28 (TH) | Studio: <ul style="list-style-type: none"> • Work on Tiny House/disaster relief shelter | <ul style="list-style-type: none"> • Bring in refined drawings • Final Quiz Due on line (10 pm) |
| 16 | May 3 (T) | Lecture/Discussion: guest speaker tbd Studio: <ul style="list-style-type: none"> • Work on Tiny House/disaster relief shelter | |
| | May 5 (TH) | Studio: <ul style="list-style-type: none"> • Work on Tiny House/disaster relief shelter | |
| 17 | May 10 (T) | TINY HOUSE DUE 10:05 – 12:05 | |

Tools and Materials List

****Most items available at Artist and Craftsman, Univ. Bookstore, some available at discount office supply stores, and a wider array of materials for project use may be available at craft/hobby shops - Michaels, Wisconsin Craft Mart, Jo-Ann Fabrics. ASK FOR A STUDENT DISCOUNT!**

A. Sketch Book - Smooth surface, Standard size (8-1/2x11)

B. Drawing Media - Pencils in 3 hardnesses: 2H - hard lead for marking and construction lines you wish to be invisible or erased without leaving dark smudges, H or F - medium lead weight for crisp drawing lines, and F or HB -soft lead for dense, bold linework and lettering;

C. Scissors & Xacto Knife (No. 1 knife with No. 11 blades ok, but for cutting wood, you will need the next larger handle Xacto);

D. Quick Bonding Agents: Craft Glue appropriate for bonding Wood, Metal, or Plastic. Double stick scotch tape, drafting tape, hot gun glue sticks, straight/T-pins.

E. Drafting tools: 45 degree triangle (8" a good size); Architect's scale.

F. Metal Straight Edge (to cut against) (12" fine). (we have some in the studios but not enough for all)

G. Matte Knife & blades for cutting heavier materials (have matte cutters in classroom).

H. Plastic Self-Healing Cutting Mat (we have some in the studios but not enough for all)

I. Medium & Fine Sandpaper; and/or **nail files** to smooth edges of soft wood & matte board

M. Toothpicks, tiny craft sticks, or coffee stir sticks for applying glue to small areas

J. Black matt board and other supplies as needed.

TED Talks: www.ted.com

Write one reaction paragraph about a Wright Lecture or a Ted talk from the list of speakers below. You will get 5 points for each talk you watch and are required to do 4 talks. Please email your paragraphs to me on or before the due date.

1. Tim Brown
2. Yves Behar
3. David Kelley
4. Amy Smith
5. Cameron Sinclair
6. Paula Antonelli
7. Nicholas Negroponte
8. William McDonough
9. Dean Kamen
10. Anything on Design thinking and/or creative confidence

Project 1: Construct Skills Exercise

Goals/Objectives:

Build skills with materials, tools, bonding agents, and measuring, cutting, and joining methods;

1. Accurate size and fit of parts; 2. Clean/crisp/straight cuts; 3. Correct execution of joints; 4. Neat bonding;

| | ITEM DESCRIPTION | MATERIALS | JOINTS and DETAILS | Possible pts | Pts given |
|---|--|----------------------|--|--------------|-----------|
| | Individually: | | | | |
| 1 | Join 2 (4" x 4") planes along long edge at right angle | Foam Core | Rabetted | 1 | |
| 2 | Join 2 (4"x 4") planes along long edge at right angle | Foam Core | Butt Joint | 1 | |
| 3 | Create two 4" x 4" frame with wood sticks. | Balsa and Bass | Miter joint | 2 | |
| 4 | Create a three-dimensional geometric form using a complex template from www.korthalsaltes.com | Cover Stock /Bristol | Glue overlapping tabs. Subtract areas of each surface to create and interesting play on mass and space | 6 | |
| 5 | Create a 4" x 4" convex curve | Foam Core | Cut straight lines about 1/4" apart and remove excess foam core to create the curve | 2 | |
| | | | | | |
| | Team Portion: | | | | |
| 6 | With a team member, create a unity of 3 rectilinear forms that are different in character and represent the relationship of dominate, sub-dominate and subordinate. The composition must be static by carefully positioning each volume along its own axis. Preparation: construct 6 or more mini 3d sketches before final construction. | Foam Core | Nested, cradled or penetrated | 6 | |
| 7 | With a team member, create a 3-D curvilinear form using a variety of planes. Create a balance of diagonal forces where each view point is equally interesting. Preparation: construct 6 or more mini 3d sketches before final construction. | Cardstock | No spirals | 6 | |
| 8 | Overall creativity and craftsmanship | | | 6 | |
| | | | | 30 points | |

Preamble: Congratulations! You and two other innovators have been given the opportunity to design an exhibit at the new School of Human Ecology Gallery, where you get to display your recent innovations. The three of you are a perfect combination of talent since you all create 2-dimensional and 3-dimensional art that is inspired by the art of tinkering. You are all makers that enjoy infusing science and technology into your work. Your designs tend to be all about the user experience and interactive.

Learning and Design Goals:

- Learn how to work successfully as a team.
- Learn how to measure an existing space;
- Learn how to build an architectural scaled model of a space;
- Use appropriate and interesting ways to define and connect spatial volumes/enclosures;
- Appropriately express approach/entry to and circulation pathways within the exhibit;
- Consider ways to encourage/lead people through the spaces using visual access and implication of “more or different experiences ahead” (i.e. Kaplan mystery concept);
- Creatively apply your knowledge of the design elements and principles to interactive forms that are interesting, unique, and visually attractive.

Part 1: Measure the existing gallery and build a scaled model. The model must include movable panels.

Part 2: Design projects/art/innovations to go in the gallery. The combined work must be cohesive and both 2-D and 3-D art work. You may use images, wire, paper, found objects, 3d printed forms, and wood. The ability to interact with your work is important and objects need to be made not bought. Design a reception desk and at least two benches for the visitors to sit on.

Part 3: Gallery Layout. Incorporate your work into the gallery space using the walls and free standing panels. Consider the flow of the space and how to draw people into different areas. Include at least two scaled human figures.

Communication Format Guidelines:

- Express solution as a white model. Use white foam core for walls and museum board for movable panels. You may incorporate color on the interior walls if it works with the art work.
- Model Scale: $1/4" = 1'-0"$ (i.e. in model 9' wall = 2-1/4" at 1/4" scale). Actual size will be communicated via notation of scale and by abstract scaled figures in model.
- The incorporation of interesting and innovative work that relate to the exhibit title and work together as a unified whole
- Include the title of the exhibit and a concept statement mounted on the wall at the entrance. (This will be very small!)
- Mount the model on black foam core or matt board and include the title and concept statement that explains the exhibit. Be sure to also include your names, the course, and the scale.

Grading Criteria:

- Craftsmanship!
- Your ability to work as a team and create a cohesive exhibit.
- A well written concept statement that describes the exhibit.
- Effectiveness of defining and relating spaces in various and interesting ways.
- Effectiveness in creating an interesting exhibit that draws people into the space.

Your group will be randomly assigned one of the following titles:

1. What's in Your World?
2. Paper Dimensions
3. Tinkering with Time
4. Natural Inputs
5. Shifting Perspectives
6. Sticking a World Together
7. In Search of Shadows
8. Whimsical Inspirations
9. One Thing Leads to Another

Project description:

Construct a scaled miniature cabinet or a table and chair set inspired by a textile selected from the Helen Louise Allen Textile Collection.

Goals and Learning Outcomes:

Gain knowledge of furniture styles and historical periods
Use appropriate and interesting ways to define shape
Use color to define form
Provide an interesting well-crafted furniture piece
Express a visually unified/harmonious and interesting/unique form concepts

Part 1: Research the textiles on line and determine which one you are interested in seeing (we will go over this in class). Sketch the key aspects of the textile that inspires you. Research the political and societal influences that were happening during the time your textile was produced. Research furniture that was produced during the time of the textile. Do at least three sketches of different furniture pieces that you are inspired by. Produce at least three sketches of your own furniture pieces which are inspired by your textile. Do refined drawings of your most successful design.

Part 2: Produce scaled elevation drawings of your furniture piece(s) (scale 1" = 1'-0")

Part 3: Build your cabinet or furniture piece to scale out of bass wood (not balsa) (scale 1" = 1'-0") You may use color and texture to enhance the design but it must reference the textile selection and not take over the form. Mount on black matt board or foam core and label.

Part 4: Produce a nicely designed bound 8 ½ x 11" packet that includes a nice cover, an image of the textile, your design research, concept sketches, elevations and one plan drawing in AutoCAD or by hand with accurate line weights, dimensions, and scale notations. Be sure to include the title of the project, your name, the course name and the date.

100 Points:

Research: completeness of textile and furniture research (20 pts)

Ideation: quality and quantity of sketches (10 pts)

Design Development: refined sketches (10 pts)

Construction Documentation: Accurate elevation and plan drawings (10 pts)**Craftsmanship:** of full scale model (10 pts)

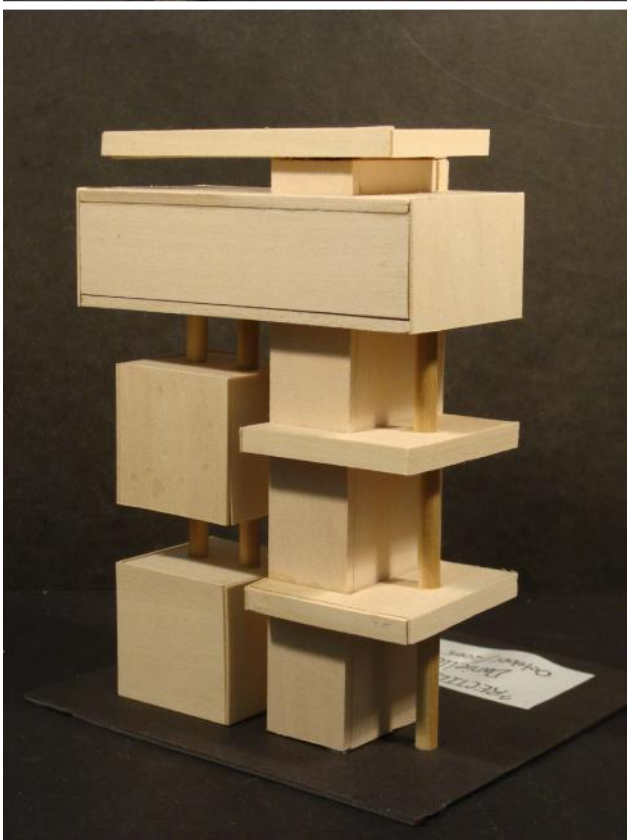
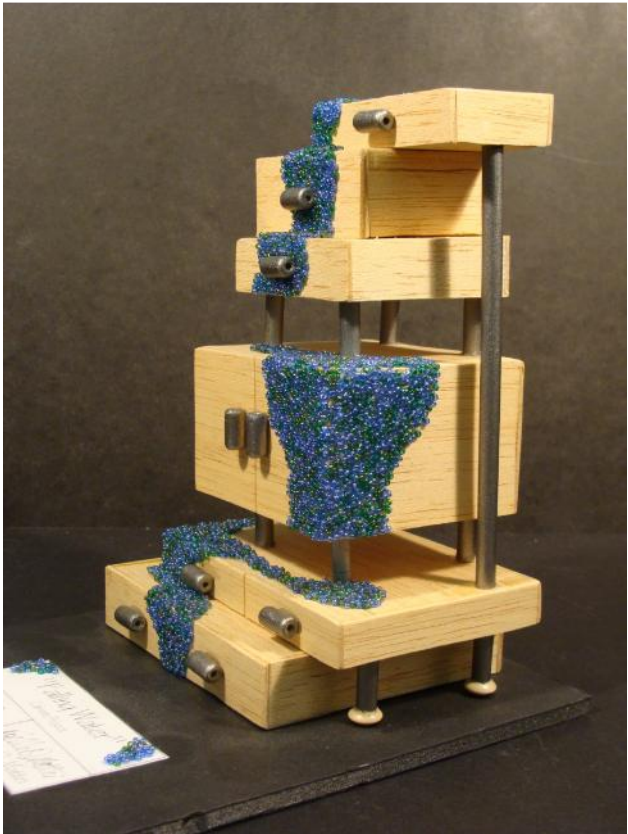
Creativity: ability to design something new and interesting while still referencing historical precedence. (10 pts)

Craftsmanship: scaled model out of Bass wood (10 pts)

Presentation: Mount piece on black matte board and include a concept statement (10 pts)

Produce: Final packet (10 pts)

Professionalism: presentation and use of time in class (10 pts)



Project description:

In teams of three, design and build a functional life size stand-up adjustable desk and a stool using cardboard. These pieces must fit the client's needs, be fully operational, and easily portable.

It seems hard to imagine that you could build a functional desk and chair from this material, but in fact, it's quite easy. Included below are some diagrams that show how a simple chair might be laid out, cut, and assembled. This example is only the simplest of an infinite number of solutions.

Concept Development:

- Develop interview questions for your clients
- Measure and interview your client(s)
- Research anthropometrics to gain an understanding of the height and scale of your piece
- Research examples of desks and chairs (both actual and cardboard).
- In groups test the strength of the cardboard by designing a small stool
- Each student must do multiple sketches and a **study model** of their favorite design. They will get voted on and one will move forward to be built to scale by the team.
- Build a to **scale prototype** of the desk and stool
- Consider the elements and principles of design as a way to design interesting and dynamic pieces.
- Consider ways that people will interact with your concepts. Is it multifunctional? Can they personalize it?

Design communication guidelines:

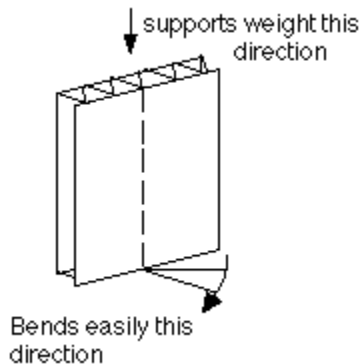
- Build the full size pieces of furniture out of as little cardboard as possible. Make your furniture functional and adjustable or collapsible.
- You may use glue and tape so long as they are used in moderation and for functional purposes only.
- You may use texture, but no color unless you receive instructor's consent.
- No exposed tape!
- Good craftsmanship is crucial!
- Design a booklet that:
 - Has a picture of the person/people
 - Defines the design problem, the goals, and the solution
 - Provides anthropometric data as it relates to the person/people and the furniture piece
 - Shows images of ideation and the prototypes
 - **Includes dimensioned to scale elevation drawings 1" = 1'-0"**
 - Includes photos of the final product. (preferably with the client!)

Materials: pencils; ruler; graph paper; corrugated cardboard, a utility knife; scissors; a 36" aluminum or steel ruler; white glue, parcel tape, and sponge (optional).

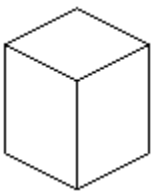
Due April 19th

Pointers:

1. Be true to the material—it's corrugated cardboard, the same cardboard they use for boxes. Don't expect to produce a Queen Anne chair, or a lever action recliner through this project.



2. Corrugated cardboard, by nature of the corrugation, has a sort of "grain" to it—meaning that it exhibits resistance to weight in one direction, and bends or folds easily along the other direction. Use this.

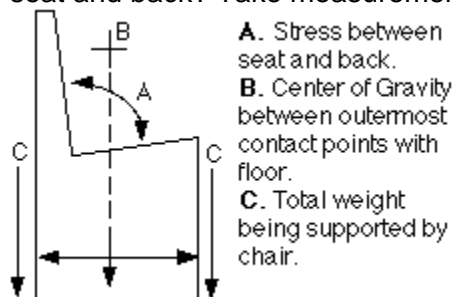


3. A triangle is the strongest architectural form using the least amount of material, but in the world of cardboard chair construction, the fully closed six-sided cube is also very strong.

4. Work with the surface strength of the two-dimensional plane. Don't waste time trying to laminate cardboard layers together. Some students try to make a chair back with two laminations of board. It's rarely successful.

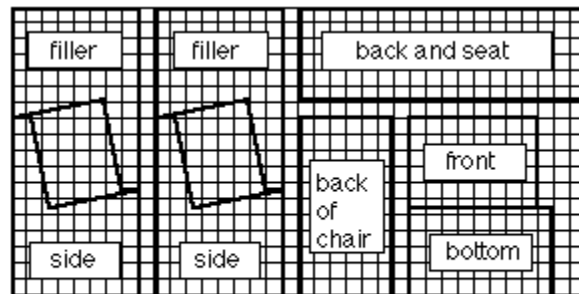
5. Cardboard has its own "aesthetic" that has been defined in part by the way we use cardboard. Don't try to paint, decorate or otherwise change the aesthetic of cardboard, rather, worship it.

How to start: As mentioned above: 1) do a number of sketches, and 2) build a scale model. Begin this project by analyzing an actual desk chair. Have you ever measured one? How many inches from the floor to the top of the seat? How wide is the seat? How high above the seat are the armrests (a word of caution—armrests are difficult)? How high is the back? Is the seat parallel with the floor? Is there an angle to the seat and back? Take measurements.



TIPS:

1. There are three things to remember about the structure—
 - A. the tension created between the seat and back when someone sits down;
 - B. making sure that the sitter's "center of gravity" is directly above a point on the floor inside the chair base;
 - C. the overall structure must support your weight!
2. Begin with sketches employing the basic dimensions of a standard chair. You might even sketch directly on the graph paper, anticipating that one square equals one inch. While straight lines are easier to execute with cardboard, curved lines might better address the contours of the body.
3. It's hard to know if you're doing a good design or a bad design when you first begin. A successful design, ultimately, will be a chair that supports your weight and allows you to lean back without falling over or having the chair back separate from the seat. What else contributes to a good design? Does the chair demonstrate design challenges? Can you lean back and be comfortably supported? Has the designer created a chair that can be made from a single trim sheet without glue or tape—just using cuts, folds, and tabs? Does the chair take risks—does it push the material to its limits?
4. You may want to start by taking the basic diagram above and using it as the basis of your design. When you have a sketch that seems plausible, consider how it translates to a *pattern*—a complex cutout shape that, when folded and assembled, becomes the chair. If you have a sketch on paper of the chair, how does that open up to become a flat piece? Start by counting out squares on the graph paper based on the dimensions of your cardboard sheet size. Once you have the profile of a design, transfer it to 1/4" graph paper, and determine the most efficient spacing.

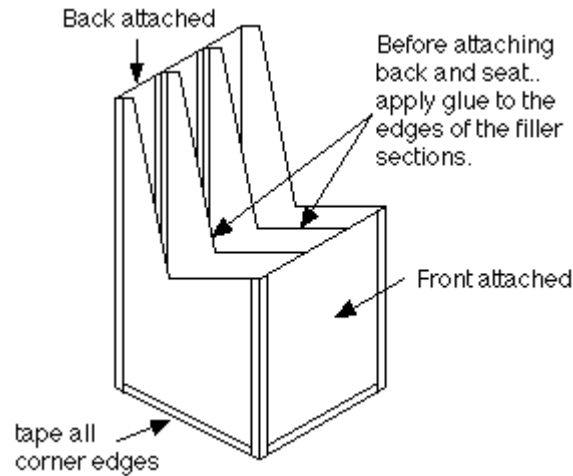


Potential diagram for laying out chair components, first on graphpaper, then on the cardboard trimsheet..

This diagram isn't too efficient with its big gaps between the pieces. Your diagram will probably be much more concisely spaced.

5. Building a prototype model: a model will reveal potential construction problems that are going to occur in the actual construction of the chair. It's nice to find out during the model phase. Models can be made from 4-ply poster board, or file folders, which are a stiff, but flexible card stock.

In the layout above, you can see that the sides are marked on the left along with filler pieces that will get spaced evenly inside the chair. If you want to use less tape and have a cleaner look to the chair, try arranging the shapes so that they fold at important junctions (ie: rather than have separate sides and a separate back, you could have one continuous piece that includes the back with the two sides hinged to it).

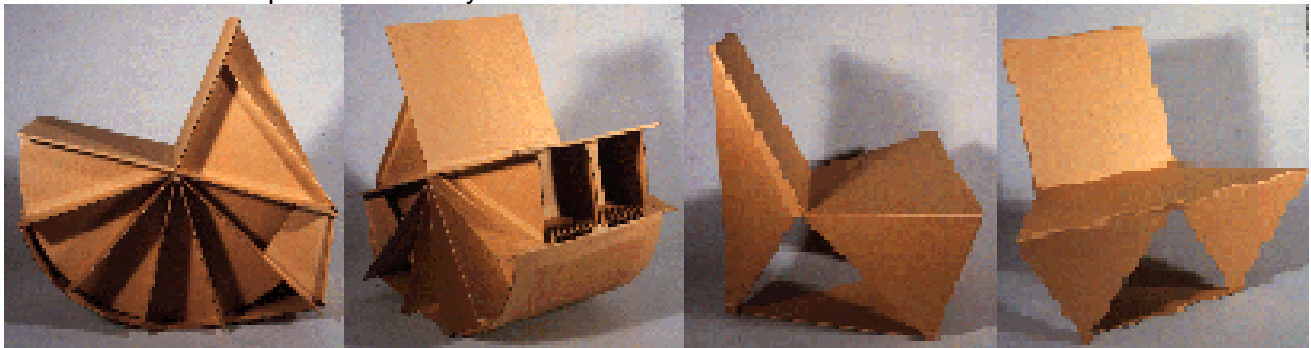


6. When you are ready to build to scale, will have to transfer your graph paper pattern to the cardboard and begin cutting. A utility knife with a retractable blade is the best. Once all the sections are cut out, you are ready to begin the assembly. If you choose to use parcel tape, fill a dish half full with water, and place a sponge in it. This is essential for wetting the parcel tape.

Outside edges which form corners are the easiest to tape, and they'll hold the form while you attach inside filler pieces. Sometimes it's helpful to apply a small square of tape to "tack" two sections in place before you dampen a long strip that will hold the entire edge. Tape everything inside securely. Glue may be useful for securing inside edges against flat planes, such as the edges of the filler pieces where they connect to the seat and back.

This project, though time consuming, is a great way to learn about designing functional objects, pattern making, engineering, and construction skills! Yes, working with cardboard, like any material, requires some skill. Determining your success is easy...in fact...you can do it sitting down!

Below are two examples of chairs by students





The Tiny House Movement: Perhaps as a result of global warming, the recent recession, or the increased occurrence of natural disasters, the trend in housing is to live small. While the Tiny House movement may be an extreme of this trend, it sends a clear message that people are rethinking the way they live and valuing quality over quantity.

A bit on Natural Disasters: Natural Disasters are affecting human settlements with increasing incidents. During the past decade communities throughout the world have suffered losses of life, livelihoods, and dwellings as a result of blizzards, hurricanes, tornados, flooding, tsunamis, drought, wildfires, earthquakes, and volcanic activity. People affected by these disasters are often required to live in temporary or emergency shelters. However, these shelters fail to consider an assortment of human factors that include: physical, psychological, and sociological needs. Interior Design is among the best-suited professions to address the health, safety, and welfare of people seeking refuge within a shelter.



The Design Challenge:

Design a region specific tiny house of no more than 400 sq. ft. for a family of four. The house must exhibit how the design and placement of a house this small can maintain/restore a sense of self, and social and cultural identity. The structure must include (at a minimum):

- Two sleeping areas, a gathering space, a cooking area, a bathroom (this is location dependent).
- The design must respond to the local community and culture.
- Sustainable solutions must be considered.
- Think outside the box; push the boundaries of creativity and innovation.
- Issues to consider when designing: possible lack of potable water, lack of security, waste management, lack of power, natural elements such as climate, rain.
- The structure must be of sound structure and afford the user a sense of security, a tent is not permitted.

Class Submission (May 10th 11:05 – 1:05):

1. Produce a scaled model of your structure (1/2" = 1'-0") mounted on a black board with a title, brief concept statement, the course, the date, and your name.
2. In addition to the requirements in DS 501, produce a labeled floor plan, four (4) exterior elevations, and at least two (2) exterior isometrics.

The Design Thinking Process

Part One: Discovery (April 28- May 3)

1. Immerse Yourself in Context

- **Plan your observations:** choose a location where a tiny house may be needed. Consider a location where a natural disaster has occurred recently. Think of certain aspects you experienced when you heard about the disaster or learned about people living in tiny houses. What emotions did you experience (surprises, frustrations, motivations, decision making factors), and why?
- **Explore and take notes:** Research on You Tube and document your findings in your sketchbook.

2. Understand the Challenge

- **Collect thoughts:** collect and write down thoughts about your challenge. Start with a broad view: ask yourself why people might need, want, or engage with our topic.
- **Establish constraints:** Make a list of criteria and constraints for the challenge. See above.

Part Two: Interpretation (May 3)

1. Share Inspiring Stories (group)

- **Take turns:** Describe the situation you researched and individuals you learned about. Interesting stories: what was the most memorable and surprising story?
- **Motivations:** what did the people care about the most?
- **Barriers:** what frustrated him/her?

2. Find Themes

- **Cluster related information:** Group findings from your research into categories. Choose something you found most interesting. Begin to look for more evidence of the same theme.

3. Make Insights Actionable

- **Develop “how might we” statements:** Create generative questions around your insights. Start each statement with “How might we...?” or “What if...?” as an invitation for input, suggestions and exploration.

Part Three: Ideation (May - 5)

1. Generate Multiple Drawings for the Shelter

- **Discuss the results:** Determine the most popular ideas and decide which ones to develop further. Be realistic about the number you can pursue—aim for two or three ideas to start with.

2. Build to Think

- **Pick an idea and design a test prototype:** create a simple expression of your idea. Present your idea to each other. Ask the other group members for feedback about their favorite parts of your prototype as well as aspects where they see room for improvement.

3. Refine Your Idea

- **Consider all aspects:** think about and document what people will be doing in and around the space. Eating, sleeping, reading, homework.... Make sure that your drawings reflect these needs.
- **Research Anthropometric Data:** consider the different activities that will occur in the space and research anthropometric data to determine the design standards in relation to range of motion.

Part Four: Experimentation (May 5 - 10)

1. Create a Prototype

- **Build the prototype:** build a three-dimensional prototype of your refined idea (1/2" = 1'-0"). You may use chip board or wood. Include a figure to help understand the scale.

Part Five: Evolution (May 10)

1. Pitch The Concept (Group)

- **Know your audience:** Think about who you are trying to get excited about the idea. Put yourself in the shoes of the listener: what will get them interested in your idea? What will they be motivated by?
- **Highlight the potential:** Create a provocative statement about the house idea. Get your audience excited about the opportunities you see. Frame it as “What if...?”
- **Build a narrative:** Tell a brief and engaging story, focusing on the most important aspects of the house. Describe what inspired your idea, and how it responds to the needs you learned about.
- **Communicate the value:** Explain the value your idea provides for the various people involved. Be explicit and illustrative in your descriptions.