San Jose State University
Department of Design // Interior Design Program

dsIT 109 | Spring 2022

Architecture of The Body

Object Design Seminar

Instructor: Marziah Zad
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Class Duration: **January 27 - May 14**
T & TH | 08:00 - 10:50 PST *

Office Hours: Tuesdays 11:00 - 12:00 / or by appointment.

** Due to online format some coursework will be asynchronous*

Course Description:

With the advent of digital tools and computational design, new possibilities are being explored in the application of complex geometries towards the future of product and object design. Advanced technologies facilitate digital design and the fabrication of complex double curvature geometries. However, materiality and the functional application of these geometries in design disciplines is still largely unexplored. Understanding design techniques that result in these complex forms as well as the effects of material types and fabrication options can help us to better realize the full spectrum of opportunities presented by these geometries in design. The central goal of our geometry-based and object oriented approach is to utilize the methods of digital design tools and fabrication systems to bridge these techniques with the space that interacts closely with the human body. We will explore digital geometries that create a dialogue with anatomy and movement as an intersection point between object and space. Throughout this seminar, we will consider wearables as a small scale space that can wrap around the human body, connecting the design of spaces, sculptural objects, and garments.

Course Intent:

Explore how to employ digital design tools and generative design techniques in the process of designing sculptural objects at the scale of the human body. Use topological surface geometries and mesh relax techniques as a generative framework to explore complex object geometries and adapt design to respond to human form and movement. The design intent is to work within a narrow creative space that focuses on generative design systems and how to employ digital tools in design. Strategies in digital fabrication and construction of topological sculptural objects.

Course Objectives:

- Focused skill building in Rhino and Grasshopper as fundamental design tools in the design industry
- Study and develop object designs using generative design strategies

- Understand the potential of human engagement, integration of form, space and structure through topological surface geometries.
- Study scale, structure, construction techniques, spatial relationships of surface geometries
- Understand the complexities of manifold surfaces in digital modeling
- Understand the structural implications of minimal/topological surface geometries in the physical world
- Investigate fabrication strategies, panelizing and rationalizing techniques for complex double curvature surfaces
- Explore the idea of how what we wear connects our bodies with itself, with others and with the broader environment.
- Explore the design of intimate space near the body, interaction of form and movement
- Investigate design opportunities presented with topological surfaces at different scales of design

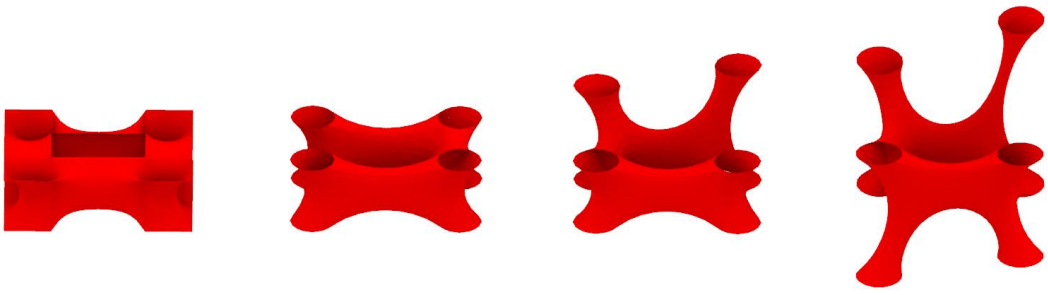
Learning Methodology:

This seminar will nominally follow a design studio format to encourage students to develop robust technical skills while learning strategies for employing digital tools and digital design techniques during the design process. Students will learn how to translate issues and criteria that are important to them into a design language that can be controlled and communicated through digital design systems. There will be regular digital presentations from students with critical input from instructor and external experts as well as lectures by the instructor. Desk crits, group discussions and critiques will be conducted during most sessions.

Course Phases and Structure:

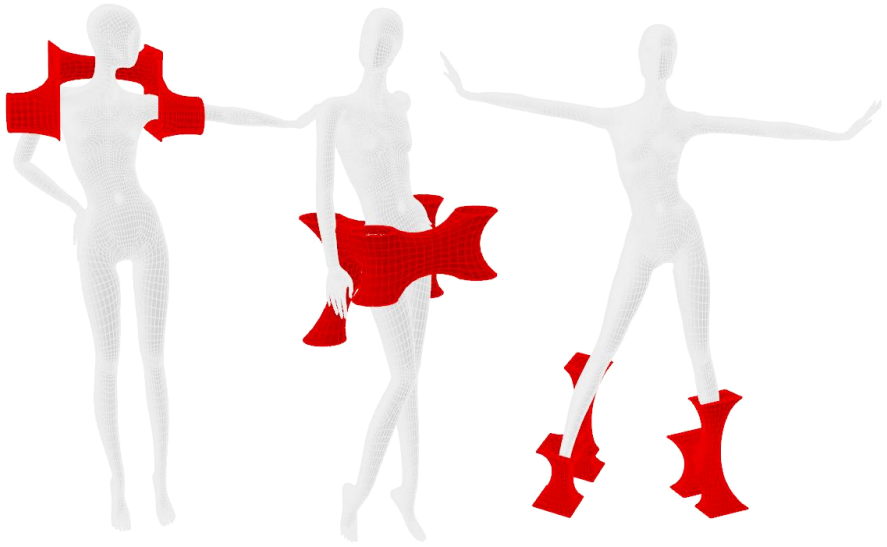
This is an investigative design seminar which will focus on the use of surface geometries and generative strategies in the process of designing wearable pieces at different scales. The seminar course follows 3 phases:

Phase I [Research and Experimentation]: This phase focuses on skill building and the investigative process. Students will use digital tools and generative techniques to create abstract and sophisticated forms through a series of digital explorations and simple material investigations. System controls will be identified, geometry behavior mapped and analyzed, variations developed. The product of this phase is a catalog library of geometric compositions and a single fabricated object prototype reflective of potential spatial and formal qualities. *This phase will conclude with midterm presentations on the 17th of March.*



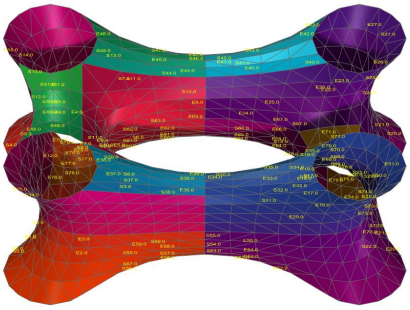
Catalog of digital explorations of complex geometries - University of Oregon students under direction of Marziah Zad, Mohsen Marizad

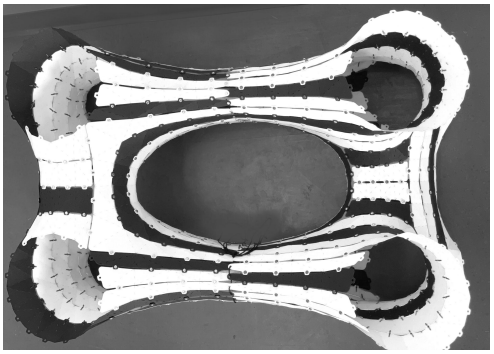
Phase II [Wearable Collection Design]: During this phase students will learn to control and adapt geometric compositions to respond to form and space at a scale intimate to the human body. With the goal of designing a collection of wearable pieces; students will adapt and refine the geometric compositions from the previous phase to develop a collection of wearables and fabricate a single wearable piece. Students will learn how to adjust their geometries to respond to different parts of the body, while still maintaining a central vocabulary and formal expression. *This phase will conclude with presentations on April 19th.*



Wearable design collection. Marziah Zad, Mohsen Marizad

Phase III [Fabrication]: During this phase students will investigate fabrication systems and materiality. Students will refine their design to optimize fabrication and resolve fabrication challenges. Students will also focus on visualization and communication systems to reflect a fashion collection or body of works. *This phase will conclude with final presentations on May 12.*





Rationalization and fabrication of a complex geometry - Kenya Tichenor under guidance of Marziah Zad, Mohsen Marizad

Technical Requirements:

Log into Canvas using the login URL: https://sjsu.instructure.com and your SJSU 9-digit ID to access our class. If you have questions about accessing and using Canvas, visit the Canvas support page. Canvas and Technology Support also is available by email at ecampus@sjsu.edu.

We will also be using Miro to share content and assignment submissions, Excel for group discussions and informal course review sign ups, Google drive to upload presentations, and Zoom for class meetings. **All significant information regarding the course and assignments can be found in this syllabus. Canvas is a support interface to facilitate tasks only.**

If you have particular Internet access challenges please inform me by sending an email to marziah.zad@iaac.net. I will discuss your learning techniques and habits with you via appointment.

You will need a laptop that is powerful enough and meets the minimum requirements to run the appropriate software for this class.

Software Requirements:

- Rhino 7
- Grasshopper + Plugins (These plugins will be posted to a Google Drive folder with a link sent to your email to download and install)
- Photoshop / Adobe Illustrator / Indesign *[Adobe Creative Suite is available to SJSU students]*
- Google slides.

You must have Rhino 7 and Grasshopper Plugins installed by the second session of class. You may purchase an academic version or download 90 days trial of Rhino 6 online at:
https://www.rhino3d.com/download/rhino-for-windows/6/evaluation
GH plugins can be directly downloaded from this Google Drive:
https://drive.google.com/drive/folders/1UmBM9L5grXXNqKa5lRbpK2404vhiVrVK?usp=sharing
Or can be downloaded from the Food4Rhino website.
You have to provide the materials for your own projects based on your design and fabrication approach, and as required for assignments. Material options depend on student design and available resources. We will discuss these together for each design.

Class Resources:

For this course I have set up a structure of tutorials, lecture presentations and design reviews conducted by myself and external experts, in order for you to receive information, technical skills and knowledge you will need for the course directly through our class sessions.
I will also upload examples, documents, presentations and other resources to the 'Files' folder on Canvas, to support particular assignments or discussions for you to review. I will inform you whenever I add something to

this folder. I also encourage you to share interesting resources you find with the rest of the class, by posting them to the folder called 'Peer Shared Resources'.
For more specific resources targeted to your particular interests, please reach out to me at any time to discuss. I will post all resources we discuss together to the Drive for all students to access.

Further Literature and References:

Websites:

- https://www.mpda.upc.edu/
- https://www.block.arch.ethz.ch/
- http://www.materialarchitectures.com/

Readings:

- West, Mark. The Fabric Formwork Book: *Methods for Building New Architectural and Structural Forms in Concrete.*Routledge, 2016.
- Otto, Frei. Rasch, Bodo. Finding Form: Towards an Architecture of the Minimal. Axel Menges Publisher. 1996.
- Descamps, Benoit. Computational Design of Lightweight Structures: Form Finding and Optimization. Wiley Publishers, 2014.
- Bach, Klaus, erthold Burkhardt, and Frei Otto. *Forming Bubbles,* 1988. Print.
- Tibbits, Skylar. *Active Matter.* MIT Press September 2017.

Lightweight Structures Research Groups:

- ETH Zurich / Block Research Group
- ZHA Code
- Vlad Tenu
- Marc Fornes - TheVeryMany

Wearable Designers:

- Noumena_Reshape Wearable Design
- Behnaz Farahi
- **Nervous Jessica:** generative design studio that works at the intersection of science, art, and technology.
- https://n-e-r-v-o-u-s.com/about_us.php

Class Schedule

Week	Date	Class Schedule
Phase I // Assignments 01, 02 | Rhino/GH Skill Building | Digital Explorations of Topological Surface Geometries		
1	January 27	- Course and syllabus introduction - Introductory presentation - Team structures - Review required GH plugins and installation process
2	February 01	- Rhino Intro and GH installation check - *Assignment 01* | *Designing Modules and Creating Assemblages* - Millipede Plugin Tutorial
	February 03	- Feedback and Review for *Assignment 01*
3	February 08	- Presentations and Discussion for *Assignment 01* - Rhino Tutorial: Spatial Objects - *Assignment 02* | *Modeling Spatial Objects*
	February 10	- Feedback and Review for *Modeling Spatial Objects*
Phase I // Assignment 03 | Rhino/GH Skills Building | Geometry Control and Catalog		
4	February 15	- Presentations and Discussion for *Assignment 02* - Geometry Gym Plugin Tutorial - *Assignment 03* | *Primitive Design and Catalog*
	February 17	- Feedback and Review for *Primitive Brainstorming*
5	February 22	- Feedback and Review for *Assignment 03* - Kangaroo Plugin Tutorial - Homework Assignment: 2 Objects with Kangaroo Plugin
	February 24	- Presentations and Discussion for *Assignment 03* - Review Homework Assignment - *Assignment 04* | *Prototype Design*
6	March 01	- Feedback and Review for *Assignment 04* - Tutorial: 3D printing preparation - Design reviews // geometry selection for prototype
	March 03	- Rhino Tutorial: Object detailing and territorialization - Midterm review requirements
Phase II // Assignment 04 | Design with Digital Tools | Prototype Development		
7	March 08	- Rhino Tutorial: Object detailing and territorialization - Design reviews - Objects sent to print
	March 10	- Design reviews // scalar design, relationships and detailing of prototype - Objects sent to print
8	March 15	- Pre-review preparation and presentations
	March 17	**Midterm Review Presentations: Catalog and Prototype**
Phase III // Assignment 05, 06 | Design a Collection of Wearables Pieces		

9	March 22	- Architecture of the Body Design Presentation - *Assignment 05* | *Wearable Collection Concept*
	March 24	- Presentations and Discussion about *Assignment 05* - *Assignment 06* | *Architecture of the Body*
Spring Break March 28 - April 01		
10	April 05	- Design reviews // Wearable Design
	April 07	- Design reviews // Wearable Design
11	April 12	- Design reviews // Wearable Design - Midterm Review Requirements
	April 14	- Pre-review preparation and presentations
12	April 19	**Midterm Review Wearable Collection**
	April 21	- Fabrication Strategies and Joinery Systems - *Assignment 07* | *Fabrication*
Phase IV // Assignment 07 | Fabrication		
13	April 26	- Feedback and Reviews // Fabrication
	April 28	- Feedback and Reviews // Fabrication
14	May 03	- Feedback and Reviews // Fabrication
	May 05	- Feedback and Reviews // Presentation
15	May 10	- Feedback and Reviews // Presentation
	May 12	**Final Presentations**

Accessibility and Special Needs:

San Jose State University is working towards creating inclusive remote learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, or if you anticipate special needs due to the unique format. You are also encouraged to find more information through the Accessible Education Center at https://www.sjsu.edu/aec/students/accommodations/

If you need course adaptations or accommodations because of a disability, please make an appointment with me as soon as possible. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

Discussion and Engagement Guidelines for Remote Participation:

Participate and Contribute: Students are expected to participate by sharing ideas and contributing to the collective learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others. More specific participation guidelines and criteria for contributions will be provided for each specific activity.

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to ensure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Requirements and Evaluation:

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

The course is organized around lectures, tutorials and design work: lectures will introduce topics and assignments and provide an overview of issues and outline the design principles and communication concepts that are expected to be investigated. Design work will be sessions focused on the exploration of design issues and communication skills. Finished projects and work in progress will be presented and discussed during most class sessions to make important points about design. Each pin-up will be graded. It is expected that your work will be prepared in a digital presentation format before review time. If it is not you will receive a grade of 0 for that assignment.

Your final grade for this class will be based on class participation in reviews and design sessions and the successful completion of assignments. The assignment grade will be based on a set of criteria including the thoughtfulness and originality of the concept, rigorous and iterative experimentation, the application of the design principles you have learned, and the time and care you have invested in making models, final objects, renderings, and presentations.

Breakdown: 100 %
Assignment 1: 10%
Assignment 2: % of participation
Assignment 3: 10%
Assignment 4: 20%
Assignment 5: % of participation
Assignment 6: 20%
Assignment 7: 20%
Participation: 20%

Class Participation will be based on preparedness for in class remote reviews and presentations and your role in contributing to the overall dialogue.

Grading Percentage Breakdown:

A = 100% to 95%
A minus = 95% to 91%
B plus = 91% to 87%
B = 87% to 85%
B minus = 85% to 81%
C plus = 81% to 77%
C = 77% to 75%

C minus = 75% to 71%
D plus = 71% to 67%
D = 67% to 65%
D minus = 65% to 61%
F = 61% to 0%

A- Excellent. Indicates work of a very high character; the highest grade is given. This grade is reserved for work that shows leadership and inspiration, demonstrating significant insight developed to its fullest extent and presented with exquisite craftsmanship.
B- Good. Indicates work that is definitely above average, though not of the highest quality. This work shows thorough exploration and development and is well presented with good craftsmanship, but it may not rise the highest level of excellence.
C- Fair. Indicates work of average or medium character. Work in this category demonstrates complete fulfillment of the stated requirements and an understanding of the issues covered, but does not exceed the expectations of understanding, development, or execution.
D- Pass. Indicate work below average and unsatisfactory. The lowest passing grade. Though work may meet the minimum requirements, it lacks depth, development or is unsatisfactorily crafted.
F- Fail. Indicates work that the student knows so little of the subject that it must be repeated in order that credit may be received. Work in this category may be unfinished, unimaginative, underdeveloped or poorly executed, and shows minimal understanding of issues.

Classroom Protocol and Attendance Policy:

As the university community adjusts to teaching and learning remotely in the context of the COVID-19 pandemic, course requirements, deadlines, and grading percentages are subject to change. I will be mindful of the many impacts the unfolding events related to COVID-19 may be having on you. Although attendance and participation is an integral aspect of course completion, I have developed all assignments and exercises for you to review in this syllabus and complete if you cannot attend the class. I will record key tutorials and lectures for you to view later. During this unusual time, I encourage you to talk with me about what you are experiencing so we can work together to help you succeed in this course. As connecting through virtual platforms is tiring and pressureful, I have tried to reduce the amount of time that you must be actively connected. Taking into account all of these considerations, it is important for me to understand why you are missing a class session at any given time. Attendance is expected at all class sessions and the student's presence through synchronous sessions is required, but for asynchronous sessions it is only suggested/encouraged.

Barring a specific need for adjustment, assignment deadlines are clearly listed in assignments and on the Canvas calendar. Any work not turned in on the due date is considered late. Ten percent will be deducted from the grade for every class period it is not turned in. Special circumstances will be taken into consideration (e.g. Illness, court appearance, death of a relative.) All assignments must be completed and turned in to receive a passing grade for the class.

The instructor reserves the right to alter assignments and change project due dates with sufficient notice to the students.

University Policies:

Dropping and Adding Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html.

Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/.

Students should be aware of the current deadlines and penalties for dropping classes. Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Academic integrity:

Your commitment, as a student, to learning, is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic coursework. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct.

Accommodation to Students' Religious Holidays:

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up for missed work. See University Policy S14-7 at http://www.sjsu.edu/senate/docs/S14-7.pdf.

Internet etiquette: Please try to follow these helpful tips: identify yourself with your real name and use a subject line that clearly relates to your contribution. Write or speak in the first person when sharing your opinions and ideas but when addressing other students or discussing their ideas, use their names (e.g. "I think red is the most important term in the poem, but I also think Kate is correct that blue is important, too"). Respect the privacy of your classmates and what they share in class. Understand that we may disagree and that exposure to other people's opinions is part of the learning experience. It is also helpful to use humor or sarcasm carefully, remembering that non-verbal cues (such as facial expressions) are not always possible or clear in a remote context. In addition, your language should be free of profanity, appropriate for an academic context, and exhibit interest in and courtesy for others' contributions. Be aware that typing in all capital letters indicates shouting. Certain breaches can be considered disruptive behavior.

Interact Professionally: Our learning environment provides an opportunity to practice being professional and rigorous in our contributions. Use discussions and activities as opportunities to practice the quality of work expected

for assignments. Moreover, seize the chance to learn from others and develop your interpersonal skills, such as mindful listening and awareness of one's own tendencies (e.g. Do I contribute too much? Too little?).

Expect and Respect Diversity: All classes at the University of Oregon welcome and respect diverse experiences, perspectives, and approaches. What is not welcome are behaviors or contributions that undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, or socioeconomic status. We will value differences and communicate disagreements with respect. We may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.

Help Everyone Learn: Our goal is to learn together by learning from one another. As we move forward learning during this challenging time, it is important that we work together and build on our strengths. Not everyone is savvy in remote learning, including your instructor, and this means we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and advice from others. No one should hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

Helpful guidelines for best practices using Canvas Discussion:

1. Use subject lines that clearly communicate the content of your post

2. Write clearly and concisely and be aware that humor or sarcasm often doesn't always translate in an online environment.

3. Be supportive and considerate when replying to others' posts. This means avoiding use of jargon or inappropriate language, and it means disagreeing with respect and providing clear rationale or evidence to support your different view.

4. Keep focused on the topic and reference readings and other class materials to support your points (as applicable).

5. Try to use correct spelling and grammar and proofread your submissions. After submitting, use the edit feature to make corrections and resubmit (don't create a new or duplicate post that corrects your error).

6. Contribute and interact often!

Helpful guidelines for best practices using Zoom:

1. Please test your video and audio prior to joining a live class session. You can learn more about testing your audio and video by visiting the UO Service Portal.

2. Try to be on time when the meeting starts. It can be distracting to have participants join late.

3. All of us occasionally need to hide video, but know that seeing your faces is a joy to me and, I believe, enriches our ways of relating—when you can, I value video on.

4. That said, please be mindful that others can see you and your surroundings if your video is on. Try to find a quiet setting without lots of noise or busy activities in the background. Please minimize distractions like eating or multitasking.

5. Use a microphone or speak closely to your computer microphone so that others can hear you. If you have video on, try to look at your camera, not the screen, when you are contributing.

6. Mute your audio when you are not actively contributing. When contributing, avoid making other noises such as typing or eating or having side conversations with others that might be present with you.

7. Use chat to pose questions or offer insights “on the side” while others are contributing. The chat can be read by all and should reflect a high standard of respect for our class community.

8. For help and troubleshooting with Zoom, visit the UO Service Portal.

Consent for Recording of Class and Public Sharing of Instructor Material:

- Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor’s permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.
- Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.
- The instructor will record lecture sessions, Q&A sessions with experts and tutorial sessions for ease of learning and reference.

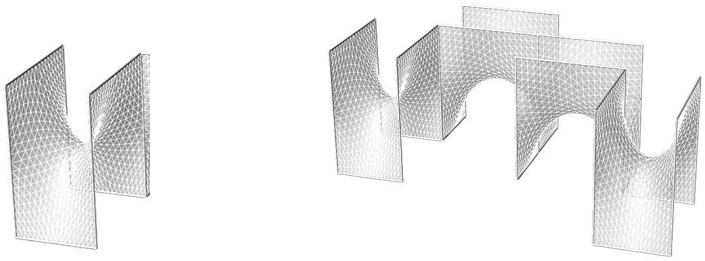
About the Instructor

Marziah Zad is an architectural designer with professional experience in Iran, Lebanon, Spain, and West Coast USA. Working with digital tools and advanced technologies, she is interested in how design impacts environments and the local to global sense of culture and identity.

Marziah is part of a Global Justice Research Collaborative, researching lightweight structures in adaptable refugee housing structures.

She is faculty of architecture, teaching at IAAC's Valldaura Labs Campus in Barcelona, Spain, the University of Oregon, and San Jose State University in the USA.

She currently lives between Barcelona and Tehran.



Digital design studies by Marziah Zad and Mohsen Marizad, 2017.

[ASSIGNMENT 01] Designing Modules and Creating Assemblages

February 01, 2022

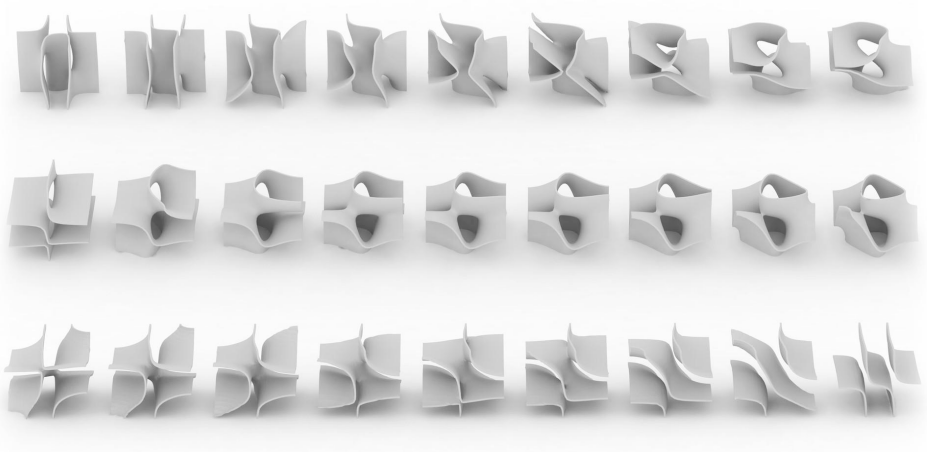
Team Assignment // Work with your team.

Due: February 08, 2022

Assignment Objectives:

- Learning basic level of Rhino and Grasshopper with the focus of generating modular double curvature geometries
- Practice design brainstorming and geometry analysis using a digital platform
- Explore the potential of modular geometries as singularities and assemblages.

Step 1. Generate Surfaces
Use Millipede, the GH Plugin tutorial to generate modular geometries. Generate at least 9 iterations (design forms with small, step by step changes to create model families) and experiment with controlling form and space. Categorize the resulting geometries, as well as the controls and variables of each system. You should have a catalog of design iterations that looks similar to the catalog table below:



Catalog of minimal surface topologies generated from single mathematical equation Zaha Hadid Architects, Design for the Museum of Mathematics, 2014.

Step 2. Assemblies
Position modular geometries in Rhino to create assemblies with a formal and spatial interplay. Note on your modular catalog which geometries are used in the assemblies. You can also further manipulate and adjust the modules in the Rhino universe.

Submit your presentation slides introducing your 1. Catalog Geometries and 2. Modular Assemblies on Google Slides Presentations.

[ASSIGNMENT 02] Modeling Spatial Objects

February 08, 2022

Team Assignment // Work with your team.

Due: February 15, 2022

Objectives:

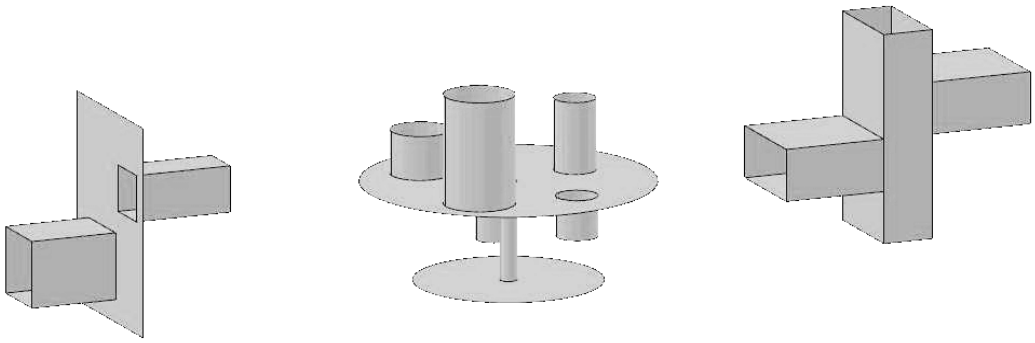
- Understanding the dialogue between form and space through very simple and repetitive primitive geometries
- Analysis of potential architectural space, concept of inside and outside, and gradient of open to closed space
- Learn basic object design operative rules which are adaptable for use with mesh relax GH plugins

Assignment Brief:
Step 01: Based on the tutorial from class today, design basic spatial objects in the Rhino interface. These objects should follow simple rules introduced in the tutorial, and only utilize the following geometries: cylinders, planar surfaces and cubes. Primitive geometries can be scaled, tilted and oriented to make interesting compositions. Once you have designed a composition that you like, using the Boolean Union command in Rhino, transform the composition into a single object.

Step 02: Moving forward, holding the ‘shift & control’ keys, select various faces from the object and delete them. It is important to create iterations of more closed to more open objects. Never have three consecutive solid faces at 90 degree angles to each other. Solid faces can exist radially to each other in open loops.

Step 03: Using 3D entourage like trees or people, give scale and a sense of space to the objects you designed.

Delivery Requirement
Present your results in the Rhino interface and on Google Slides on September 07. Upload your presentation formatted Rhino file to Canvas.



Spatial Objects by Marziah Zad

Primitive object catalog. Designed by Alex, Ning, Enni, Mo, SJSU dsIT109 Fall 2020.

[ASSIGNMENT 03] Primitive Design and Catalog

February 15, 2022

Team Assignment // Work with your team.

Due: February 24, 2022

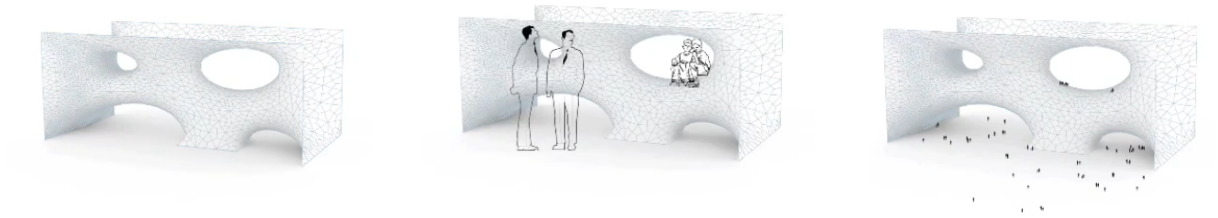
Assignment Objectives:

- Skills building using GH plugins and digital mesh relax systems
- Design brainstorming, generative systems and geometry analysis in digital platforms
- Object design through mesh relax framework and constraints related to GH plugins

Step 1. Generate Geometries
Following guidelines from Assignment 02, develop compelling spatial objects in the Rhino interface. Using the Geometry Gym plugin and following the GH tutorial introduced today, to relax the objects and create smoothened objects. Note how the Rhino Brep input affects the GH relaxation and deformation process. You need to learn how to analyze mesh relaxed outcomes and control generated forms.

Step 2. Catalog of Object Primitives and Controls
Generate at least 9 iterations (design forms with small, step by step changes to create model families) and experiment with controlling form and space. Categorize the resulting geometries, as well as the controls and variables of each system. At the completion of this assignment, you should have a catalog of design iterations which also introduces the system logic, generative process and system controls.

Submit your presentation formatted Rhino file to Canvas and two Slides introducing your 1. Catalog Geometries and 2. Form Generation Process and system controls on Google Slides Presentations.



Scalar Studies of a topological geometry by Marziah Zad

[ASSIGNMENT 04] Prototype Design and Midterm

February 24, 2022

Team Assignment // Work with your team.

Due: March 17, 2022

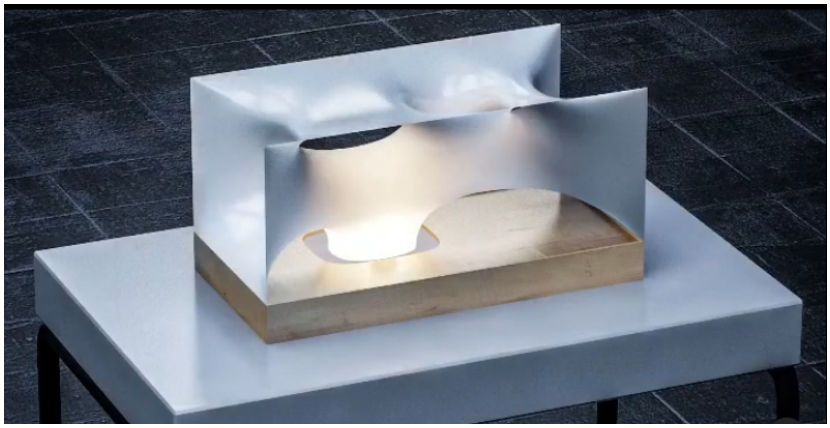
Assignment Objectives:

- Understand the spatial potential of topological geometries at various scales
- Learn to manipulate and further develop and detail GH outcomes in the Rhino interface
- Explore the translation of abstract objects to various functions and contexts
- Digitally fabricate a complex geometric prototype

Together with your team, select a primitive geometry from your catalog library developed in assignment 03 which illustrates the greatest formal and spatial potential. Collaborate with your team to decide how the abstract object can function at three different scales: 1. As an object or furniture, i.e. jewelry or a lamp 2. At an interior design scale to fit within and interact with an interior space 3. At an architectural scale such as a megastructure building or urban element.

Based on the scale and attributed function, revise and manipulate the GH prototype output in the Rhino interface to adapt and respond to specific scalar and functional criteria. Add detailing such as glass, structural elements and connecting and contextualizing elements.

This assignment is part of your first mid semester submissions and the specific requirements will be shared with you accordingly.



Lamp fixture design by Mohsen Marizad, Raha Ashrafi and Marziah Zad

[ASSIGNMENT 05] Wearable Collection Concept

March 22, 2022

Team Assignment // Work with your team.

Due: March 24, 2022

Assignment Objectives:

- Identify unifying objectives in the design of wearable pieces which interact with the human body
- Consider conceptual ideas that relate to the body, movement and form
- Transition into issues related to space around the body and intimate architecture

Together with your team, discuss and consider how what we wear connects us to and protects us from others and our environments. Based on the presentation today, evaluate themes that are important to you and can create a unifying theme in the design of a wearable collection.

Topics can range from various physical abilities, i.e. prosthetics, physical aiding devices to anatomy, i.e. strategies for augmenting height and stature for petite people, or environmental issues i.e. protective gear for harsh climates or rapidly changing ecologies, or social and identity issues i.e. Black Lives Matter, Gender Roles, LGBTQ, and cultural themes such as culture of origin, religion, etc.

You are not limited at all in your topic. Keep in mind that your theme should be a source of inspiration and provide direction and structure for the design of your wearable collection together with your team. Consider these points when choosing your preferred topic.

[ASSIGNMENT 06] Design a Collection of Wearables Pieces

March 24, 2022

Team Assignment // Work with your team.

Due: April 19, 2022 | 2nd Midterm

Objectives:

- Use a generative framework in Rhino to create a collection of wearable pieces that are aesthetically and morphologically related, while responding to anatomy, movement and function.
- Develop a design approach as a framework; moving beyond the direct structure of digital tools and generative design
- Design visualization and communication: students must curate a virtual fashion show and accordingly present their designed pieces
- Fabrication

Design collection by Amanda Rehm, Daisy Ma, J. Cameron. SJSU 2020, Instructed by Mohsen Marizad.

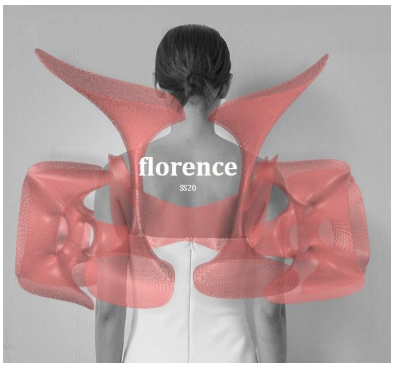
Assignment Brief:

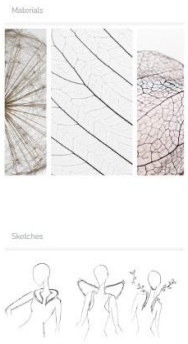
This assignment will move beyond the use of Rhino as a modeling tool to design simple objects and prototypes. Drawing on the skills you have gained throughout the course as well as the strategies in generative design that you have mastered by now, you can discuss in your group a particular approach or theme through which to communicate your ideas. For example, you can focus on movement, and design pieces that obstruct or facilitate posture and motion in defined ways. Or you can focus on connection and interaction, etc. This phase is a milestone in your process of learning generative design through digital tools; the collection of pieces should reflect your particular aesthetic, passion and design perspective.

Initial phase fabrication is a requirement for this assignment. Together with your team, you will need to fabricate a simplified version of your designs for the midterm.

Delivery Requirement

The delivery requirements for this assignment will be shared with you well before your midterm presentations, based on your progress and skill level demonstrated throughout the semester. However, a virtual fashion show will require fine renderings of your design pieces, as well as strong post production and some level of animation or animated graphics.





Design collection by Amanda Rehm, Daisy Ma, J. Cameron. SJSU 2020, Instructed by Mohsen Marizad.

[ASSIGNMENT 07] Complex Geometry Rationalization and Fabrication

April 21, 2022

Team Assignment // Work with your team.

Due: May 12 | Final Presentations

Assignment Objectives:

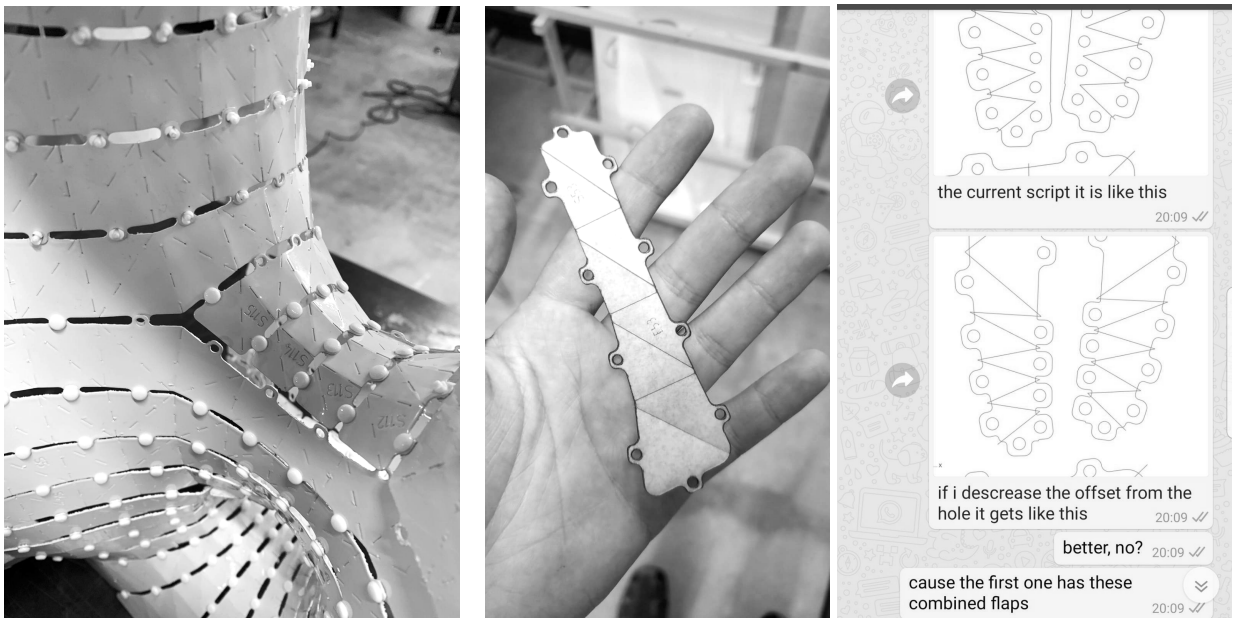
- Prototype a complex geometry
- Fabrication techniques for large-scale 3D printing
- Joinery systems and fabrication detailing

Assignment Brief

Using fabrication techniques and joinery systems you learned in class, prepare one of your wearable pieces for fabrication. You must decide on materials and joints based on your design and understanding of scale. You must consider the amount of material used based on the rationalization strategy and/or the dialogue between material, geometry and rationalization system and how this will affect your assembly process and the resulting structural stability/rigidity of your design.

The scale of your prototype is a 1:1 scale of a wearable piece that can fit a person of typical height and weight in the USA.

Final review requirements and deliverables will be shared with you during class.



Fabrication process and troubleshooting with aluminum sheet metal and revit joints. Mateus Sartori, Marziah Zad.