



Science, Technology, Ecology, Arts and Mindfulness  
-- nonlinear quantum **STEAM** for the future leaders  
and teachers who will inherit the Earth. Our lessons  
are **BOTTOM UP** -- just like nature works and we  
move back and forth between analogue and digital.  
We start with nano and end up in space -- having fun  
all along the way -- as we believe **PLAY** and  
**COLLABORATION** are the key.

# Table of Contents

[Introduction](#)

[Faculty & Staff](#)

[Frequently Asked Questions](#)

[Schedule](#)

[Week 1](#)

[Week 2](#)

[Workshops](#)

[Graphine and Carbon Molecules – Victoria Vesna](#)

[Imagining Techniques: From Atoms to the Biological Scale – Sam Lilak](#)

[Solidarity Through Sound and Time – Ivana Dama and Clinton Van Arman](#)

[Eco-sensing – All instructors](#)

[Microbial Theater – Mick Lorusso and Joel Ong](#)

[Fungi as Sustainable Building Materials – Kaitlin Bryson](#)

[PsychoBread – Clarissa Ribeiro](#)

[Bio Maison – Clarissa Ribeiro](#)

[Listening to Nature: Building a Very Low Frequency \(VLF\) Radio – John Brumley](#)

[Data Dust | VR and Photogrammetry – Zeynep Abes and Eli Joteva](#)

[Metaphor as a Method for Inquiry – Monica C. LoCascio and Kaitlin Bryson](#)

[Remote Sensing the Red Planet – Shane Houchin](#)

[Calming the Sea – Christoph Kilian](#)

[Lectures](#)

[Material List](#)

[Home Lab + Studio General Materials](#)

[Materials By Workshops](#)

## Introduction

SciArt Lab + Studio is designed for students of all disciplines with the goal of inspiring and supporting critical thinking outside of the box, exploring divergent and convergent thought, and encouraging collaboration with their peers. Learning objectives include: expanding forms of inquiry to include alternative and embodied methodologies, application of art-based and scientific research through creative projects, development of ecological literacy, development of technological and haptic skills, and fostering collaboration and communication. These goals have not changed within the virtual format, though we are aware there will be different results, projects, and reflections for students in this year's program. We are open and interested to see what students come up with and will be working closely with them to facilitate the best learning possible.

---

# Faculty & Staff

## **UCLA Professors (curriculum / lectures):**

Dr. Victoria Vesna, Art|Sci Center, Department of Design Media Arts, Founder + Director  
Dr. James Gimzewski, Department of Chemistry, Scientific Director

## **Advisors:**

Dr Adam Stieg, CNSI Associate Director, SciArt Director Emeritus  
Dr. Claudia Jacques, Sci Art Associate Director Emeritus

## **Visiting Professor:**

Dr. Clarissa Ribeiro, Innovation and Prototype Lab Director, UniFor, Brazil

## **Instructors:**

Kaitlin Bryson, MFA Art & Ecology, Lead Instructor, UCLA Art|Sci  
Sam Lilak, PhD researcher, Chemistry, Dr. Gimzewski Lab, UCLA  
Zeynep Abes, Design Media Arts, Graduate Student, UCLA

## **Workshop leaders:**

Monica C. LoCascio, MA student, Angewandte, Vienna, Austria  
Shane Houchin, PhD Student, Geology, CalTech  
Mick Lorusso, MFA, Los Angeles  
John Brumley, PhD Empowerment Informatics, MFA Design Media Arts, Napa, California  
Eli Joteva, MFA, Design Media Arts, UCLA  
Alvaro Azcarraga, Design Media Arts Graduate Student, UCLA

## **Undergraduate student assistant instructors:**

Design Media Arts:  
Clinton Van Annman, Ivana Dama, Nancy Wu  
Shilpa Rao

## Frequently Asked Questions

### **1) What are the learning goals for the Sci Art Summer Institute, *and* how have they changed in light of the new virtual format?**

The class is designed for high school students of all disciplines getting ready for college / university. The main goals are to inspire, teach and support critical thinking outside of the box, explore divergent and convergent thought, encourage collaboration and create an international community with their peers.

Learning objectives include: breaking down the two cultures of art & science, expanding forms of inquiry to include alternative and embodied methodologies, application of art-based and scientific research through creative projects, development of ecological literacy, development of technological and haptic skills, and fostering collaboration and communication.

The goals have not changed within the virtual format, though we are aware there will be different results/projects/reflections for students in this year's program. We are open and interested to see what students come up with and will be working closely with them to facilitate the best learning possible.

### **2) How will the "UCLA experience" be shared in this all-virtual format?**

This question is something we are actively defining as we know this is such a vital aspect of our summer program. In order to facilitate this, we are working to provide students with as much peer interaction as possible – in the off hours of the course we will host “watch parties” for SciFi film screenings as well as a virtual show-and-tell. The lab and campus visits will be recorded and streamed for students to see our amazing facilities and campus resources.

Also, SciArt Lab + Studio is modeled after Dr. Victoria Vesna's UCLA online Honors Course, [BioTech & Art](#) and online studio course -- Design Media Arts Special projects -- [BioNanotech & Art](#). The content, course work, and expectations are college-level and will maintain these parameters in its remote format. Every day will be devoted to a particular theme with required reading and students will be asked to maintain a blog/sketchbook that incorporates their own ideas in relation to the subject. This quarter, Dr. Vesna taught these courses all online, and so we have a successful example and model for the program.

**3) Upon successful completion of the program, are the 4 University of California college credits still given to the students and how can they be transferred to other college programs?**

This course is still an intensive UC pre-college course and students will receive 4 transferable UC credits. The process of transferring credits varies by school so the students will contact the school that will be receiving the credits to get information on the required process. What we provide for them is their transcript which can be requested via MyUCLA once grades have been finalized.

**4) How many students will there be?**

We base the number of instructors on student enrollment. Each student is placed in a small group (15) with a lead instructor. This will be the student's "home room"/team. Each day the team will meet to check in, discuss course content, go over any questions and provide feedback and review. This instructor will work intimately with the students and will always be available to answer questions and provide guidance and feedback. All groups meet at the beginning and end of the day if in the same time zone and view recorded experiences of those who are in a different time zone. They all have an opportunity to comment on the daily journals / blogs that students keep throughout the course.

**5) What type of interaction will students have with instructors and program personnel --- beyond the zoom/virtual lectures and demos? Will there be mentors or advisors assigned to the students to attempt to capture some of the "UCLA experience"?**

We want students to have a genuine UCLA experience and we are ensuring that our programming and staffing reflects this. Each student will be placed in a 'home group / team' for intimate interaction with peers and instructors. We have instructors in three time zones (PST, CET, CST, SST) to ensure constant live interactions.

Our teaching staff includes UCLA Professors: Dr. Victoria Vesna (Art, Science, Technology), Dr. James Gimzewski (Chemistry), and Dr. Clarissa Ribeiro (Associate Professor, Experimental Practices in Architecture UNIFOR - University of Fortaleza ), along with professional instructors: Dr. Adam Stieg (NanoScience), Kaitlin Bryson (Art and Ecology), Mick Lorusso (Art and

Ecology), Sam Lilak (Chemistry), Monica LoCascio (Art and Science, Angewandte, Vienna) and Eli Joteva (Art, Science, Technology). We have current UCLA postdoc Sam LoCascio and graduate student Zeynep Abes (Design Media Arts); Cal-Tech graduate student Shane Houchin (Geology), along with undergraduate student assistants Ivana Dama and Clinton Van Arnham (Design Media Arts) to maintain a diversity of instruction and experience level. Our staff builds the foundation for true college-level, interdisciplinary learning and development to take place.

The course will feature workshops from SciArt Staff and guest lectures from world-renown scientists and leading researchers and artists from around the world. Furthermore, as SciArt is partnered with California NanoSystems Institute we work intimately with [CNSI research partners](#). During all of the workshops and guest lectures, students will be able to ask questions and participate with the instructor lead or guest lecturer in real time. For students outside of the US, their hub instructor will facilitate these live- interactions.

For more information about the SciArt Staff - see question 11

**6) What are expectations for the HOME LAB that creates a college-level experience?  
What is the supply list and will it be covered/provided with the program fee?**

The intention for the Home-Lab is to empower students to build and create their own lab and studio environment so that they are able to conduct experiments, research and artwork. The home-lab will be reflected with applications from actual labs and studios as part of the course content. The expectation is for students to create a modest at-home lab/studio that enables them to work on course material.

The supply list will be sent out to students 6 weeks in advance, so there is plenty of time to obtain materials. We are not able to provide materials to students due to the difficulty in accessibility and shipping across the world. The fee for the course does not cover material costs due to shipping issues, but the 40% reduced course fee considered this expense. We are working diligently to ensure that we maintain low-costs for material fees.

**7) Will there be an attempt for my student to meet other students and develop some peer relationships?**

In the Remote Summer Institute we are emphasising COMMUNITY - this will be addressed in every aspect of our programming and assignments.

Students will be working together online throughout the duration of the course they will be in their teams each day and will also be collaboratively creating work and conducting research. We are also designing methods and games that facilitate dynamic and exciting interactions between the students – learning into online videos, slack and animation as platforms for connection.

### **7) How will the Hox Zodiac dinner take place?**

The Hox Zodiac Dinner is a very fun collaborative dinner that will take place over zoom! Instructions for this dinner will be provided the first day of instruction, and an example can be found [here](#). This is another opportunity for students to come together and share food - over a safe platform. This dinner also engages issues around CRISPR, cloning, genetic engineering and multi-species collaborations. It is fun and a great way to connect around these issues and informally discuss these topics. An informational video on the Global Quarantine edition can be found [HERE](#), current course work and scholarship can be found [HERE](#), and the original project can be found [HERE](#).

### **8) Will there be some attempts at in-person social distancing events? Are there plans to meet on UCLA campus or on different local sites at all?**

The situation with COVID 19 virus and other social disturbances is very fluid and unpredictable with guidance from city/county leaders changing often. Our highest priority is to ensure the safety of all of our communities during this time while facilitating learning and allowing for a college experience to take place. However, at all times we must remain in compliance with University Guidelines for COVID 19 and since this is changing often, there might be a possibility that we will be able to accommodate local students coming together while following social distance guidelines. We are at this point assuming that in-person meetings will not take place but look forward to having groups meet post-pandemic.

### **9) What are the midterm and final projects and what type of one-on-one or group guidance will be provided to students by instructors? Are the projects individual or in small groups?**

The midterm assignment requires the students to present final project proposals. Groups must present their ideas to all instructors, and instructors respond in a formal critique and review,



providing feedback and resources for development. Instructors will be working one-on-one guidance.

The final project asks students to collaboratively “IMAGINE THE IMPOSSIBLE” and create an imaginative and research-based solution to a contemporary global issue. Students form small collaborative groups based on interest and work together towards conceptual development. Student groups are responsible for providing a final presentation that includes the following: 1) An abstract of the research; 2) Development of concept; 3) Social Context; 4) Literature Review/precedents; 5) Project proposal – what is the project, how does it work? What is it made of? 6) Impact of the proposed project; 7) Discussion points. You can see some final presentations [here](#)!

#### **10) What are the safety considerations with DIY home workshops on bacteria? How will the labs be college level instruction/content?**

With every microbial at-home-lab there will be a plethora of safety information and precautions to take. We will not be doing **any** high-risk lab work and will talk extensively about lab safety and students will be using Low tech materials to do hands-on activities and engage in High Tech concepts. Examples are: origami and DNA - folding techniques, cultivating mycelium as a sustainable resource, sound and science - building tools to listen to our environments; VR and AR and photogrammetry; and at-home microscopy

#### **11) What is the Art aspect of this program? What about the Science?**

The art aspect of the program is in each workshop and mode of thinking. As a collective, we advocate for art-based, scientific research and also for modules of thinking that combine art and science in application and methodology. For example, we facilitate learning about microbiology and our body's microbiome through collaging microscopy images into an exquisite corpse. Each aspect of our program is designed to activate all areas of the brain. Scientific information and research are expanded through making artwork, and vice versa. Our team of artists, scientists and creative technologists are prime examples of this type of work in place. And students will be shown and get to experience these examples extensively throughout the course!

Our director, [Victoria Vesna](#) is a practicing ArtSci Artist. You can see her [current work here](#) at the Natural History Museum in Vienna, Austria! And the work of our instructors also provides

good examples: [Kaitlin Bryson](#), [Mick Lorusso](#), [Eli Joteva](#), [Clarissa Ribeiro](#), [John Brumley](#), [Monica C. LoCascio](#)

Our Scientific Director, Dr. James Gimzewski, Distinguished Professor of Chemistry, facilitates our science team and collaborators. One of our instructors is PhD candidate in Chemistry, [Sam Lilak](#) and Neuroscientist, [Samuel LoCascio](#) leads a workshop and lecture about CRISPR and neuroscience.

The diversity of our team and instruction is what optimizes the SciArt experience. With the combination of our varying pedagogies students are immersed in multiple modes of thinking at once allowing them also to get feedback from a wide-range of people and disciplines. This stimulating environment creates innovative and thoughtful projects and responses to contemporary issues.

---



# Schedule

*From Nano to Stardust*

July 26 - August 6, 2021

## REMOTE

UCLA Sci|Art Lab+Studio Summer Institute,  
CNSI (California NanoSystems Institute) UCLA

**All instruction is in real time / synchronous / we have dedicated  
instructors in the States, Europe and Asia!**

# Week 1

## DAY 1 | 7/26

## INTRO LECTURES TO SCI|ART & NANOSCIENCE

9:00 - 10:30

Introduction to Sci|Art Lab+Studio:

Welcome Art & Science

Collaborations: Towards a Third culture | Prof. Victoria Vesna

Introduction to California NanoSystem Institute by Dr. Adam Stieg

Associate Director of Technology Centers; Integrated Systems

Nanofabrication Cleanroom; Nano & Pico Lab: Sci Art

Collaborations | Prof. James Gimzewski

10:30 - 10:50

Students are introduced to their group. Mindful connection

10:50 - 12:00

Getting to know our Lab + Studios: Workshop Bio Mason |  
Prof. Clarissa Ribeiro

12:00 - 1:00

Lunch - eat with groups via zoom

1:00 - 2:00

How to keep a field / lab / notebook / sketchbook / journal  
Kaitlin Bryson / Sam

2:00 - 2:30

30 min Break

2:30 - 3:30

Eco-Sensing (Mick Lorusso)

3:30 - 4:00

30 min Break

First blog post (instructions)

7:00 - 9:00

Watch Party: Movie TBD

## DAY 02 | 7/27

## UNDERSTANDING NANO | TIME TO BE REALLY SMALL

9:00 - 9:15

Review and prep for day: Sam Lilak

9:15 - 9:45

Lecture: Tools of Visualization | Dr. Adam Stieg

9:45 - 10:00

Break

|               |  |
|---------------|--|
| 10:00 - 11:00 | Live Virtual Lab Tours - videotape @ CNSI (Sam Lilak)<br>Ars Electronica future lab (Europe) / Japan |
| 11:00 - 12:00 | Solo Lab: Diffraction and Wave Particle Duality and Imaging<br>Techniques   Sam Lilak                |
| 12:00 - 1:00  | Lunch (solo or in groups)  |
| 1:00 - 1:30   | Lecture: Graphene   Dr. Kaner  |
| 2:15 - 4:00   | Solo Lab: Pencil Drawings: Graphene / Graphite   Dr. Vesna   |
| 4:00 - 4:30   | Break out lab: share your drawings and make group collage  |
| 7:00 - 9:00   | Blog 2 + prepare a mushroom dish for tomorrow's lunch<br>SciFi Series WATCH PARTY                    |

### **DAY 3 | 7/28**

### **BIO- MINDS | MOLECULES | MYCELIUM | BACTERIA**

|               |   |
|---------------|---|
| 9:00 - 9:15   | Review and prep for day: Kaitlin  |
| 9:15 - 10:15  | Lecture/workshop pt.1: Fungal Ecology + Fungi as Sustainable<br>Building Material   |
| 10:15 - 10:30 | Break   |
| 10:30 - 12:00 | Workshop and Collaborative Studio: Microbial Theater  <br>Mick Lorusso and Joel Ong |
| 12:00 - 1:00  | Lunch (share your mushroom dish)  |
| 1:00 - 2:00   | Break out lab: Fungal and microbial cultivation                                     |
| 2:00 - 2:30   | Break   |
| 3:30 - 5:00   | Workshop: TBD   |
| 6:30 - 9:00   | Meet up with your group / have dinner together                                      |

**DAY 4 | 7/29****SOUND, SCIENCE AND ECOLOGICAL NETWORKS****9:00 - 9:15**

Review and prep for day

**9:15 - 10:15**

Lecture: Dr. Victoria Vesna  
NOISE AQUARIUM -- underwater noise pollution / planktons

**10:15 - 10:30**

Break

**10:30 - 12:00**

Workshop: Listening to Natural Radio | John Brumley

**12:00 - 1:00**

Lunch

**1:00 - 3:00**

Workshop: Solidarity Through Sound and Time |  
Ivana Dama, Clinton Van Arnman

**3:00 - 5:00**

Assignment: Blog / RECORD / LISTEN / COMPOSE / SOUND  
COLLAGE

**DAY 5 | 7/30****SPACE AND QUANTUM DATA****9:00 - 9:15**

Review and prep for day

**9:15 - 9:45**

Lecture: Alien Stardust | Victoria Vesna + Eli Joteva  
MICROMETEORITES

**9:45 - 10:15**

Collecting dust around your house (magnet)

**10:15 - 12:00**

Workshop: Pt. 1 Data Dust | Zeynep Abes | Eli Joteva

**12:00 - 1:00**

Lunch

**1:00 - 3:00**

Workshop: Pt. 2 Data Dust | Zeynep Abes | Eli Joteva

**3:00 - 3:15**

BREAK

**3:15 - 4:30**

Remote Sensing on the Red Planet | Shane Houchin

**4:30 - 5:00**

Discussion of midterm

**6:30 - 9:00**

Sci-Fi Film Series: 2001: A Space Odyssey

**DAY 6 | 7/31****FIELD TRIP****9:00 - 12:00**

ECO-SCAVENGER HUNT: Know Your Local Environment  
through the sidewalk herbarium | Alvaro Azcarraga

**2:00 - 5:00**

Collecting: Micrometeorites  
Eco-samples

Assignment: Photogrammetry Scans

**DAY 7 | 8/1****12:00**

\*Deadline to submit photogrammetry scans

**2:00 -- 3:30**

Fungi as Sustainable Building Material Pt. 2:  
Molding our Mycelium!

## Week 2

**DAY 8 | 8/2****FOLDING, CUTTING, LINKING****9:00 - 9:30**

Review Week 1 | Intro Week 2

**9:30 - 9:45**

Stretch break

**9:45 - 12:00**

MIDTERM Group presentations

**12:00 - 1:00**

Lunch - Mozilla Gallery Opening Reception

**1:00 - 2:15**

Lecture/Workshop: CRISPR Applications & Implications |  
Sam LoCascio

**2:15 - 2:30**

BREAK

**2:30 - 3:30**

Origami workshop (TBD)

**3:30 - 5:00**

Photogrammetry Gallery opening and hangout // reception

**7:00 - 9:00**

Doc film: NOVA: Origami Revolution

## **DAY 9 | 8/03**

### **EAT or EATEN**

9:00 - 9:15

Review and prep for day

9:15 - 10:15

Workshop: PSYCHO bread | Prof. Clarissa Ribeiro

10:30 - 12:00

Workshop: Metaphor as a Method of Inquiry |  
Monica LoCascio and Kaitlin Bryson

12:00 - 1:00

Lunch: Eat your bread

1:00 - 2:30

AM Radio and Tomato Piano | Clarissa Ribeiro and Mick Lorusso

2:30 - 3:00

Break

3:00 - 3:15

Brief tutorial about Hox Zodiac | Monica LoCascio and Victoria  
Vesna

3:15 - 6:00

Prepare your food and research your zodiac and animal

6:00 - 8:00

Hox Zodiac dinner -- offer you meal / story

10:15 - 12:00

Lecture: Genetic engineering and animals | Professor Victoria  
Vesna

## **DAY 10 | 8/04**

9:00 - 9:15

Review and prep for day

9:15 - 10:15

Lecture: CONNECT THE DOTS -- connect all that we discussed  
micro to macro

10:15 - 12:00

Workshop: BRAIN DUMP -- offline: draw a diagram of everything  
/ start talking about an idea

12:00 - 1:00

Lunch

1:00 - 5:00

Final projects // studio + work time - Individual group meetings  
with instructors



6:00 - 9:00

Sci-Fi Film Series: Blade Runner

**DAY 11 | 8/05**

9:00 - 9:15

Review and prep for day

9:15 - 10:15

Lecture: Ethics of Art + Science | Rita Blaik

10:15 - 12:00

Final projects // studio + check in

12:00 - 1:00

Lunch

1:00 - 3:00

Final projects // studio + check in

**DAY 12 | 8/06**

**CLOSING PROGRAM**

10:00 – 11:00 am

Welcome & Program Review

11:00 – 1:00 pm

Final Presentations

---

# Workshops

## *From Nano to Stardust*

### Graphine and Carbon Molecules – *Victoria Vesna*

**Materials:**

- Paper
- Pencil

### Imagining Techniques: From Atoms to the Biological Scale – *Sam Lilak*

There are many things we cannot naturally perceive with the naked eye, including bacteria, viruses and molecules. Understanding what limits the resolution of an eye or analytical instrument is paramount towards being able to visualize these otherwise unobservable species. This hands-on workshop aims to introduce what factors limit the resolution of a measurement, and how our knowledge and manipulation of quantum mechanics enables us to visualize materials down to the nano- and atomic scale. We will collectively investigate these fundamental properties through hands-on activities and explore how they are applied to state-of-the-art instrumentation in modern research.

**Materials:**

- Generic Laser-pointer (green)
- Paper spectrometer
- DVD (disc)
- Electrical tape

## Solidarity Through Sound and Time

### - Ivana Dama and Clinton Van Arnman

“Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating.” - John Cage

In this workshop, students would have the unique chance to reconsider their ideas of what constitutes sound and music. Throughout the day we are exposed to countless amounts of sounds and noises, but it is only valuable if we can isolate these specific sounds and separate their relationship from memory to their pure tonal structure. Everyday life is more interesting, when we become aware of it.

#### **Materials:**

- Required:
  - smart phone/recording device
- Optional:
  - Headphones
  - Any attachable microphone to enhance the quality of audio

## Eco-sensing – *All instructors*

In the ECO-SENSING workshop students observe, sense, and record the ecological relationships in different areas around or in their homes. They will use their own facilities, ecological mapping techniques and cell phone apps to better understand each site’s full spectrum of interrelating elements, from the molecular to the global scale. They will think about pattern, sound, air, and electromagnetic radiation as different aspects of the ecological web. Students will look at the presence of waste and collect inorganic and organic objects from each site. Back in their lab space, students will activate collected materials, photos, writing, drawing and imagery sourced from the internet in multimedia performances, integrating computers and materials in living circuits to tell stories about ecology and the role that humans play in shaping and shifting environments.

#### **Materials:**

- Sketchbook

- Writing/drawing utensil
- cell phone apps (temperature sensor, audio spectrometer, and emf sensor)

### **Microbial Theater – *Mick Lorusso and Joel Ong***

The workshop is part of a collaborative research project by bioartists Joel Ong and Mick Lorusso, whose collaborative works explore the multitudes of microbes that inhabit our world as witnesses to the unfolding of planetary life through cataclysm, adaptation, conflict and partnership. Students use DIY Microscopy to examine microbes found in and around the home and on their bodies. They combine the footage from their microscopes with online sources to create videos and/or live performances on Zoom or social media.

#### **Materials:**

- plug and play USB microscope
- glass slides
- slide covers

### **Fungi as Sustainable Building Materials – *Kaitlin Bryson***

This workshop teaches students about fungal ecology (mycology) and focuses on how to work with fungi and mycelium as a sustainable building material. It will also cover the potentials that fungi carry as bio-remediators, or organisms that can assist in environmental clean-up. We will begin by learning about the biochemistry of fungi, and then talk about their unique physiology which allows them to survive and thrive in harsh environments. Our fungal-forms will be started at the beginning of the course, and will continue to grow throughout the two weeks!

#### **Materials:**

- [Mycelium grow-kit from Ecovative](#)
- Flour
- Water
- Tape
- A form to cast mycelium into
- Scissors

## PsychoBread – Clarissa Ribeiro

There is mounting evidence that the spectrum of microbial species living in the mouth is, both in diversity and composition, a close representation of the microbiome inhabiting the gastric fluid and gut. Considering our digestive system regulates behavior, guess what can happen when we exchange molecular information by sharing a bread that's made from our own saliva?! Can the remaining molecular information in dead bacteria such as lactobacillus still influence behavior? Well, some renowned researchers are starting to prove that the answer is yes! The workshop led by Clarissa Ribeiro will invite students to make their own psychobreads using samples of our salivary microbiomes for the fermentation process.

### Materials:

- Flour
- Honey
- Water
- Saliva
- Mixing bowl
- Baking sheet
- Oven

## Bio Maison – Clarissa Ribeiro

During COVID-19 this workshop invites students to reflect and inspect the invisible cross-scale interactions and integrations within the home environment mediated by our bodies. It is inspired by the series *Femme Maison* by Louise Bourgeois. Together we will build cross-scale exquisite corpses combining extruded microscopic scans of home surfaces with bodies and body parts. We will make 3D models of these bodies using free online platforms. Additionally, we can visualize the final models in AR and VR or even produce paper sculptures with flattened versions of the 3D models.

### Materials:

- USB or webcam microscope
- Register to use (create an account) <https://app.sketchup.com/>
- Access: <http://www.embossify.com/>
- Access: <https://3dless.com/>

*\* All apps are available online via browser*

## **Listening to Nature: Building a Very Low Frequency (VLF) Radio – John Brumley**

In this workshop we will build an antenna for recording electromagnetic waves in the VLF spectrum and attempt to isolate and identify signals from planetary and cosmic sources.

We will consider the relationship between electromagnetic and acoustic waves, sources of interference, and the human impacts from producing these waves.

1. Waves: mechanical, electromagnetic, acoustic.
2. Signals and communication, human and natural
3. Building and testing the antenna
4. Recording with the antenna, methods and causes of interference, audio signal Processing
5. Sharing!

### **Materials:**

- Loop frame (hula hoop, wooden cross, stick, easel)
- Lots of wire
  - 60-100m based on frame size, smaller frame diameter means more wire
  - 24 – 18 AWG / 0.5 -1.0mm diameter
- Insulated magnet wire, multicore cable wired in series (clarification)
- Audio connector, audio cable
- Portable recording device
  - Digital recorder, something with detected audio input
- Sketchbooks

## **Data Dust | VR and Photogrammetry – Zeynep Abes and Eli Joteva**

In this workshop you will learn the art of photogrammetry, point clouds and shared virtual spaces.

- Scan an object (plants, flowers, street signs, murals) you feel belongs or represents where you are from. You will be using the app “*display.land*” to complete the photogrammetry.
- Process and edit the point cloud scan in app.
- Export the ply and obj files from the app and upload them onto sketchfab.

- Visit our shared exhibition space on Mozilla Hubs and exhibit your model to show everyone your work!

Photogrammetry Lecture: The goal of this 3-day workshop is to provide students with a working knowledge of photogrammetry. Students will receive instruction on photogrammetry, including the associated equipment, workflow planning, and shooting techniques. Upon completion, students will be able to describe the advantages and disadvantages of each technique, understand their applications, and define and articulate goals when designing a photogrammetry documentation project. They will also receive a brief history of volumetric video capture.

Photogrammetry Workshop: Now that the students have learned the basics of photogrammetry, they will choose a subject to scan. Using their smartphones or cameras, they will shoot images of the subject to create it in 3D form. Once shooting is done, they will process their photos on a photogrammetry software to create their 3D meshes.

## Metaphor as a Method for Inquiry

### – *Monica C. LoCascio and Kaitlin Bryson*

This workshop looks at how metaphor has been used throughout history as a building ground and methodology for examining the world around us and as a tool for embodying and understanding the scientific method. We will look at connections between mycelial networks, body and muscle fascia, and textiles/weaving. Through applications of hacking and building our own looms, we will apply our understandings of metaphors through weaving and binary technology.

#### **Materials:**

- 3 different colors of yarn (20 meters of each color)
- Ruler
- Scissors
- Cardboard
- Pencil or large tapestry needle

## Remote Sensing the Red Planet – *Shane Houchin*

Robotic missions to planets and moons beyond Earth provide invaluable insight into how the Solar System formed and evolved and are crucial for assessing the potential of habitability, both in the past and for future human explorers.

This workshop is designed to introduce students to fundamental concepts in geology and planetary science. By examining geologic processes and the morphologic features they produce here on Earth, we can learn to recognize similar features on other worlds and gain insight to the processes occurring there. On Mars for example, active sand dunes show us that our nearest neighbor is presently a wind dominated planet, while dry river deltas indicate that water flowed across its surface in the past. Using GoogleEarth, JMars, and other remote sensing software, students will use the concepts introduced in the workshop to identify a potential landing site for a future robotic mission to Mars and will be asked to justify their choice of landing site and specify the type of instruments they think should be included on the rover (camera, mass spectrometer, XRF and XRD instruments, wind gauges, etc.).

### Materials List:

- GoogleEarth/Mars: <https://www.google.com/earth/versions/#earth-pro>
- JMars: <https://jmars.asu.edu/download>
- \*both programs are available for free download

## Calming the Sea – *Christoph Kilian*

Following Athanasius Kircher's idea of subterranean channels, I would like to invite you to a workshop, where we will add just another layer of channels to unite as a global orchestra.

Go to your nearest sea or river shore. Connect to the virtual meeting room. Meet your fellow classmates online. Let the sounds and moving images of the waves and currents flow together. We will play with multichannel near-simultaneity, exploiting transmission latencies and temporal offsets, experiencing diffractions and interferences — overlapping, amplification and extinction of waves in a global live *disconcert*.



**Material List:**

- Jitsi (download)
  - Smart phone
  - Sketchbooks
-

# Lectures

- Welcome Art & Science
- Collaborations: Towards a Third culture by Prof. Victoria Vesna
- Introduction to California NanoSystem Institute by Associate Director of Technology Centers; Director, Integrated Systems Nanofabrication Cleanroom; Director, Nano & Pico Characterization Lab: Dr. Adam Stieg
- Sci Art Collaborations by Prof. James Gimzewski
- How to keep a sketchbook and field notebook by Kaitlin Bryson
- Tools of Visualization by Dr. Adam Stieg
- Graphene by Dr. Kaner
- The Extreme Powers of the Microscopic: Mycelium and Bacteria by Kaitlin Bryson and Mick Lorusso
- Sound, Science and Listening Ecology by sound artist Bill Fontana
- CRISPR: Applications and Implications by Dr. Sam LoCascio
- Origami by Prof. Victoria Vesna
- Ethics of Art and Science by Dr. Rita Blaik
- Extreme Environments by Scott Hessels

# Materials List

## HOME LAB + STUDIO GENERAL MATERIALS

These materials will be used throughout the workshops and labs

- Sketch book (A4 / Letter | minimum size) [Example](#)
- drawing materials: 2 [Pencils \(4b & 2hb\)](#) and 2 pens for writing
- [1 permanent marker](#)
- Clear tape
- Duct tape
- Petri dishes 100 mm x 15 mm, Sterile, pack of 10 or 20 [Example](#)
- Microscope slides and coverslips [Example](#)
- Plug and play USB microscope (suggested [Amscope](#))
- Agar agar [Example](#)
- Lab tools: [Tweezers](#)
- [Gloves](#)
- Clean surface/table
- [Isopropyl alcohol](#)
- Computer
- Smart phone: links to the apps (Iphone 11, XS, XR, X, 8, 7, 6s, SE) (Samsung S8,S9,S10) (Pixel 2,3,4)
- Kitchen stove
- Pyrex or [small ball mason jars](#)
- [Zyploc bags](#)
- Sugar
- Flour
- Q-tips
- Food coloring

## MATERIALS BY WORKSHOPS

This is a list for students for each workshop. Items in **PURPLE** are materials specific to this workshop. Please note that some materials are time sensitive. Items in **ORANGE** should be ordered as soon as possible

### Graphine

- Clear Tape
- Drawing pencil
- sketchbooks

### Bio Masion

- USB microscope
- Sketchup app (free)
- Embossify (free)
- 3dless (free)

### Calming the Sea

- Jitsi (download)
- Smart phone
- Sketchbooks

### Imaging techniques

- 1 generic laser pointer (green) [Example Source](#)
- USB Microscope
- Electrical tape [Example](#)
- Paper spectrometer [Build your own](#)
- 1 blank DVD
- Zip file of software packages to be used (will be provided ahead of time)

### VLF Listening to Natural Radio

- Loop frame (hula hoop, wooden cross, stick, easel) -- 1 -- good to find used or very inexpensive -- possibly free / less than \$10
- Wire -- 100m of 24AWG (0.5mm), spool of enameled magnet wire is a good -- [example, 8oz spool is enough](#) -- \$10-\$30
  - 60-100m based on frame size, smaller frame diameter means more wire
  - 24 – 18 AWG / 0.5 -1.0mm diameter
- Audio connector, audio cable -- 1 each -- [1/4" Jack 1/4" Cable](#) (6.35mm / mono is fine). If your device only has 3.5mm (1/8"): [3.5mm Jack 3.5mm Cable](#) -- \$10

- **Portable recording device** -- 1 -- [1](#), [2](#), (lots of more expensive [ones](#), but not necessary for this project) -- \$30-50+
  - Digital recorder, something with direct audio input (need to be able to plug the antenna into the device, old recorders, voice recorders or laptop can be OK if they have a dedicated microphone input (single input for headphone/microphone might not work!), note: larger screens / phones / electronics can add to interference)
- Sketchbooks

### AM radio and Tomato Piano

- Ardunio Uno
- 9v battery
- Male jumpers
- USB cable
- 4.7Ohm resistors
- Tomatoes
- Metal ruler

### Metaphor as a method for Inquiry

- **At least 3 different colors of yarn** [Example](#)
- Ruler
- Scissors
- Cardboard
- Pencil (sharp) and/or large [tapestry needle](#)
- Sketchbooks

### Psychobread

- Flour – 1 cup
- Water – ½ cup
- Honey – 1 tablespoon

### Remote sensing the Red Planet

- Google Earth Pro (free) <https://www.google.com/earth/versions/>
- JMars (free) <https://jmars.asu.edu/download>

### Micrometeorites

- **Rare earth magnets** [Example](#)
- Ziploc bags
- Gloves

### Sound and Solidarity:

- Smart phone
- Headphones
- Attachable microphone to enhance the quality of audio

### Eco-Sensing

- Sketchbook
- Computer with slide presentation software (google slides, Microsoft powerpoint, keynotes)
- Smartphone with EMF app and temperature app installed
- **EMF meter app suggestions:**
  - [Apple](#)
  - [Android](#)
- Temp app suggestions:
  - Apple @thermometer Mobiquite
  - Andriod: Smart thermometer

### Microbial Theater

- plug and play USB microscope, glass slides, [q-tips](#), [food coloring](#)
- [sugar](#), [petri dishes](#)
- [agar](#), [yeast based vegetable broth](#)
- Notebook
- Software: Mozilla Spoke, Mozilla Hubs, Zoom

### Data Dust and Photogrammetry

- Smartphone (either android or iphone)
- Display.land app (free)
- Computer

### Mycelium as a sustainable building material:

#### Part 1:

- **1 grow kit from [Ecovative](#)**
  - 4 tbsp flour
  - 3 cups of water
  - Isopropyl alcohol
  - Gloves
  - Duct tape
  - Scissors

- A dark/quiet place to put your bag

**Part 2:**

- [Plastic bag \(large\) or plastic bin \(to create humidity chamber\)](#)
  - A mold or cast to cast our object (will clarify on day 1)
-