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

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:
Ivana Dama, Design Media Arts, Lead Instructor, UCLA Art|Sci
Sam Lilak, PhD researcher, Chemistry, Dr. Gimzewski Lab, UCLA
Emma Aakmakdjian, Design Media Arts, Graduate Student, UCLA

Santiago Torres, PhD researcher, Division of Astronomy, UCLA

Ema Koh, MS Computer Science, UCLA

Ivy Lovett, Design Media Arts, UCLA

Workshop leaders:

Kaitlin Bryson, MFA Art & Ecology, UCLA Art|Sci

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:
Jennifer Hotes
Biochemistry:
Matthew Teeter

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.

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.

2) 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.

3) 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 plus assistant 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.They all have an opportunity to comment on the daily journals / blogs that students keep throughout the course.

4) What type of interaction will students have with instructors and program personnel? 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.

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; Ivana Dama (Design Media Arts), along with undergraduate student assistants Jennifer Hotes (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 9

5) What is the supply list and will it be covered/provided with the program fee?

All the supplies and materials would be provided by UCLA SciArt Studio+Lab.

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

At Sci Art Summer Institute we are emphasising COMMUNITY - this will be addressed in every aspect of our programming and assignments.
Students will be working together throughout the duration of the course they will be in their teams each day and will also be collaboratively creating work and conducting research.

7) How will the Hox Zodiac dinner take place?

The Hox Zodiac Dinner is a very fun collaborative dinner that will take place at CNSI auditorium! 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) 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!

9) 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, Ivana Dama

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

June 27 - July 8, 2022

SESSION A: IN PERSON

July 11 - July 22, 2022

SESSION B: VIRTUAL

UCLA Sci|Art Lab+Studio Summer Institute, DMA (Design Media Arts)
CNSI (California NanoSystems Institute) UCLA

Week 1

DAY 1 | MONDAY	**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
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 | TUESDAY	**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) Ars Electronica future lab (Europe) / Japan
11:00 - 12:00	Solo Lab: Diffraction and Wave Particle Duality and Imaging 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 SciFi Series WATCH PARTY

DAY 3 | WEDNESDAY	**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 Building Material
10:15 - 10:30	Break
10:30 - 12:00	Workshop and Collaborative Studio: Microbial Theater | Mick Lorusso and Joel Ong
12:00 - 1:00	Lunch
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 | THURSDAY	**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 | FRIDAY	**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 | SATURDAY	**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 | SUNDAY	
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 | MONDAY	**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
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 | TUESDAY	**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
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 | WEDNESDAY	
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 | THURSDAY

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 | FRIDAY	**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 *dis*concert.

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
- Graphine 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 all materials would be provided to all students.**

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 -- ¼" Jack ¼" Cable (6.35mm / mono is fine). If your device only has 3.5mm (⅛"): 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)
