

Physics/School of Art + Design

PHYS 495/ARTS 499 THE PHYSICS OF ART: THE ART OF PHYSICS FALL 2023

M 9:00 – 11:40 am

Siebel Center for Design, room 1000

Instructors

[Patrick Earl Hammie](#), Studio Art

Email: phammie@illinois.edu

Instagram: [@patrickearlhammie](#)

[Jessica Raley](#), Outreach and Communication

Email: jlrale@illinois.edu

[Nicolas Yunes](#), Physics

Email: nyunes@illinois.edu

Teaching Assistant

Kristen Schumacher, Physics

Email: kes13@illinois.edu



Sarah Sze, *Ripple (Times Zero)*, 2020

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> COURSE DESCRIPTION

This class is an interdisciplinary seminar/laboratory of creativity exploring through the lenses of art and physics. Group discussions, sharing, and critiques, along with lectures and hands-on exercises in communication, physics, and visual art, will help us achieve the goals below.

The goals of this class are to:

- Develop a brave and critical space to imagine otherwise and develop research questions.
- Understand the disciplinary methodologies used by scientists and visual artists.
- Articulate proposals and ideas that are legible across the arts and sciences.
- Explore interdisciplinarity, collaboration, and creativity.
- Learn from each other and take ownership of our creative forces.
- Produce collaborative and independently generated creative projects, informed by research, that aim to communicate either (i) a physics concept in a radically new artistic way, or (ii) an element of the human experience through physics-inspired metaphor.

Students completing this course will be able to:

- Define and recognize creative processes and apply methods to activate their own imagination and innovation skills.
- Explain and implement the iterative process both in the Arts and in the Physics.
- Design, develop, and produce creative projects that synthesize visual art and physics.
- Communicate about their creative art in writing and orally to their intended audience.
- Evaluate their own projects and that of their peers.

> COURSE REQUIREMENTS

Attendance

Attendance is required at all class sessions. Class begins at 9:00 am, and goes to 11:40am with a 10-minute break at the mid-point. Failure to be present and prepared to work or meet by 9:00 am will count as a tardy. **3 tardies** equal one absence. Students are allowed **1 absence** without penalty. Each absence beyond 1 will result in a full letter drop in the student's grade for the course. If a student arrives late, it is their responsibility to contact the professors to have their absence changed to a tardy.

Please email us if you are going to be absent. Students are expected to respectfully participate in class activities and to attend public events and lectures listed on the syllabus calendar. If you are unable to attend an event or lecture, an alternative assignment will be provided.

Creative projects require different types of labor and amounts of time than many other academic courses. Plan to spend at least 12 hours a week on guided and self-directed learning activities. Once a learning activity is available to you, successful students begin them early and connect with other students for quick questions and feedback.

Where You Can Work

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You can complete work beyond the class in Flag Hall (assigned studio) or your private studio (apartment, bedroom, etc.). If you plan to use the facilities (easels, palette tables, sinks, and storage) in Flag Hall, you must not remove easels, tables, and other equipment. If classroom equipment needs refilling, servicing, or replacing just send a note through [Lab/Studio/Classroom Support](#) (it is easy).



> CONTACT US

Contact us through email at phammie@illinois.edu; jlraley@illinois.edu; nyunes@illinois.edu; kes13@illinois.edu. Remember to copy all of us on every communication. We will try to respond by the next day (if we receive the message before noon on Friday), but please be patient. If your matter is urgent, mark it “urgent” in the subject line. If you would like one on one support outside of class, we will meet by appointment through Zoom or in person. If you have a quick question about an activity, consider asking a fellow student in Slack before emailing us.

> GRADING AND EVALUATION

We have devised a comprehensive evaluation approach that will include the following:

- Class participation (40% of the final grade), including in-class critiques, discussions, hands-on assignments, attendance of external events, and homework assignments.
- Midterm proposal (20% of the final grade), evaluated by faculty.
- Final project (40% of the final grade), evaluated by faculty.

A successful student will attend all the lectures, actively participate in class discussions, demonstrate creativity in their hands-on assignments, be an active member of the class, consistently iterate their ideas based on feedback and critique, and create a final project that is successfully exhibited on campus. A successful final project communicates a solution to their self-generated question in a fashion that is both aesthetically appealing, scientifically accurate and engaging to the public.

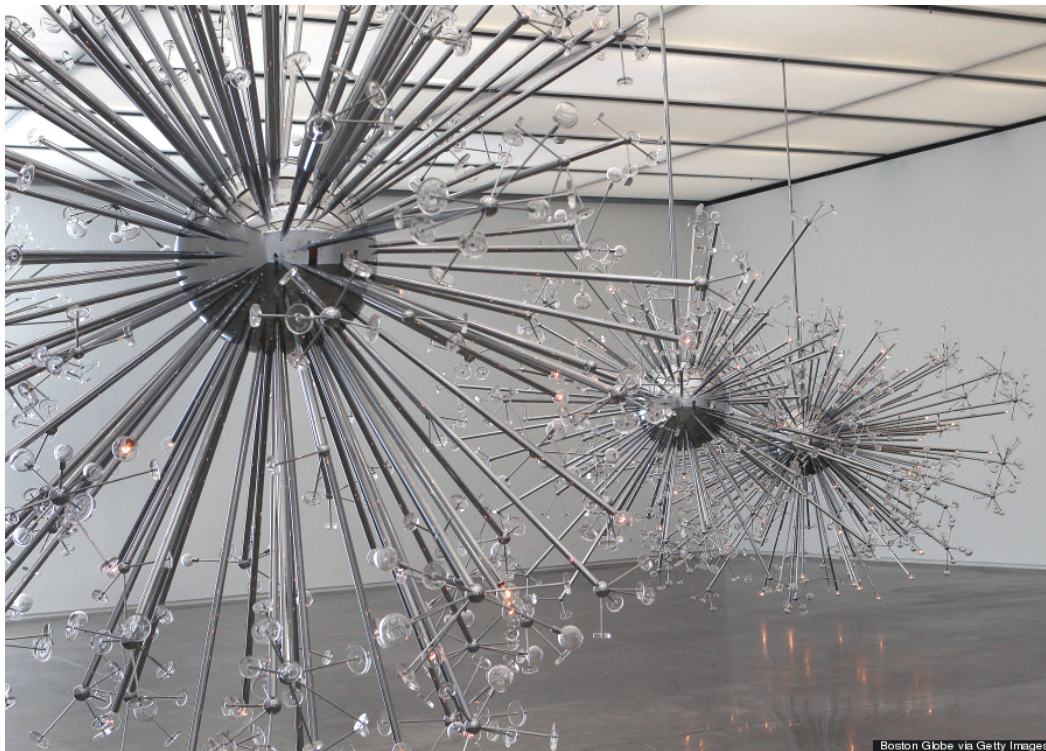
Grades will be defined as follows:

A = Excellent

Expansive investigation of ideas and excellent composition. All assignments completed on time and executed well. Insightful contributions to class discussions and critiques. *Goes substantially beyond minimum requirements.*

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- B = Good** Substantial investigation of ideas with good composition and good craftsmanship. All assignments completed on time, insightful contributions to critiques and class discussions. *Meets minimum requirements.*
- C = Fair (Average)** Assignments and iterations done competently and mostly on time.
- D = Passing** Limited investigation of ideas, poor craftsmanship, incoherent compositions, minimal contribution to critiques.
- F = Failure** Course failure due to minimal idea development, poor craftsmanship, incoherent compositions, lack of participation, late assignments.



Josiah McElheny, *Island Universe*, 2008

> TEXTS (Recommended)

- Books
 - [Why Is That Art?: Aesthetics and Criticism of Contemporary Art](#), 2nd Edition, Published by Oxford University Press
 - [Art as Experience](#), 1st Edition, Published by TarcherPerigee
 - *Sparks of Genius: The 13 Thinking Tools of the Most Creative People*, by Root-Bernstein, Publisher: Mariner Books
 - *Colliding Worlds: How Cutting Edge Science is Redefining Contemporary Art*, by Arthur Miller, Publisher: W. W. Norton & Company
 - *Art and Physics: Parallel Visions in Space, Time and Art*, by Leonard Schlain, Publisher: William Morrow Paperbacks
 - *Art & Science*, by Sian Ede, Publisher: I.B. Tauris

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- *Seen/Unseen: Art, Science and Intuition, from Leonardo to the Hubble Telescope*, Martin Kemp.

> CALENDER



Mikael Owunna, DeShaun, 2017

The 15-week duration (1 semester) of the class will be divided into 3 integrated phases:

- (i) The *gathering* (3 weeks),
- (ii) The *sandbox* (4+1 weeks),
- (iii) The *castle* (4+1 weeks).
- (iv) *Exhibition and reflection* (1+1 weeks)

During the gathering, students will concurrently explore, experiment and learn about topics related to art and physics through lectures, engaged dialogue, and activities to stimulate creativity. During this phase, students will also brainstorm ideas for their exhibition.

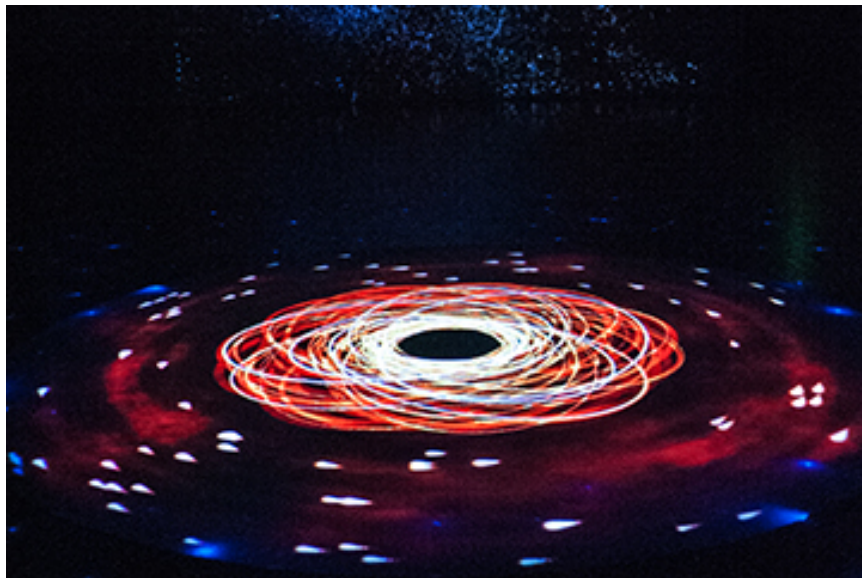
In the sandbox phase, students will iteratively develop their ideas through drawing and three-dimensional prototyping and modeling for their final body of work. In weeks 8 and 9, the students will present *proposals* that describe the concept and plans for the exhibition of their

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body of work. The scope of the proposed project must be commensurate with the 5 weeks of time allotted to develop the final exhibition.

In the castle phase, students will realize their concepts into a physical body of work. This body of work may consist of a single project or a series of related gestures. The format of the body of work can include various art forms, including visual, multimedia, performance, etc.

In the exhibition and reflection phase, the body of work developed during the castle phase will be exhibited in the Link at the Krannert Museum of Art, and we will reflect together and individually on class experiences.



Class schedule

- *The gathering.*

Week 1 – Getting Started

- (30 mins) 9:00-9:30 Introductions and ice-breakers
- (50 mins) 9:30-10:20 In-class exercise: Uncanny Juxtaposition
 - Display art/physics object you brought.
 - Each student speculates about a new “absurd” meaning of at least 5 displayed objects (using sticky notes).
 - Combine 2 or more objects to create a new object.
 - Discuss new object(s) is and how it imagines a new nature.
- (10 mins) 10:20-10:30: Break
- (60 mins) 10:30-11:30 Watch and discuss:
 - [Mae Jemison: Teach art and science together](#), TED
 - [History of Ideas – Art](#), by The School of Life
 - [What is Art For?](#), by The School of Life
- (10 mins) 11:30-11:40 **Homework for next week:**
 - Begin with the provided list of artists/authors for inspiration.
 - Conduct research to discover an artist working at the intersection

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of art and science. Submit the artist's name, 1-3 images of their work, and a short (1 page) reflection to the instructors in Box folder. The reflection should include reactions, questions, inspirations, connections to other artists, etc. evoked by this work. Be prepared to share in class during the Text Bazaar.

Week 2 – Methods and Measurements

- (30 mins) 9:00-9:30 Receive Studio Keys (Flagg Hall)
- (35 mins) 9:30-10:05 Methodologies and expectations in professional practice: Physics
 - Discuss the professional practice of physics.
 - What is considered “good” work in the professional practices of visual arts, physics?
- (20 mins) 10:05-10:25 Use the white boards to illustrate your interpretation of the discussed physics concepts
- (10 mins) 10:25-10:35: Break
- (35 mins) 10:35-11:10 Methodologies and expectations in professional practice: Visual Arts
 - Discuss the professional practices of visual arts.
 - How do *you* measure/quantify “quality” for exhibiting, publishing, or posting, and how do you determine what’s appropriate for the audience?
 - What is considered “good” work in the professional practices of visual arts, and how do you determine that?
 - What can you do to attract and encourage attention in your work?
- (20 mins) 11:10-11:30 In-class exercise: Text Bazaar
- (10 mins) 11:30-11:40 **Homework for next week:**
 - Introduction to the awesomeness of the Siebel Center’s maker spaces/resources
 - [Review Shop Website](#)
 - Tour the facilities
 - Take Blue Square Training
 - Using a concept or idea in physics as a metaphor, create an artwork that speaks to another concept or idea in culture.
 - Attend [Fall 2023 Public Opening Night Reception](#), Krannert Art Museum, Thursday, August 31, 5-7p
 - Watch [“Welcome to Einstein’s Universe,” spoken word, written by Zack Bean and performed by Spencer Mirabal](#)

Week 3

Labor Day (no class)

- **Homework for next week:**
 - Attend Einstein’s Gravity Playlist at [Staerkel Planetarium](#)
 - Read Chapters (PDF Handout)
 - *The Interdisciplinary Turn in the Arts and Humanities*, by William Condee, Publisher: Ohio University

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- *Interdisciplinary Arts*, by Tanya Augsburg, Publisher Oxford University Press
- Watch:
 - [Black Holes](#), by Kurzgesagt
 - [Time: The History & Future of Everything](#), by Kurzgesagt

Week 4 – Making Time, Making Space

- (30 mins) 9-930: Share Homework Project
 - (20 mins) 930-950: Interdisciplinarity - What does it mean to “work across fields”?
 - (30 mins) 950-1020: Space and time - Black holes (spacetime, not immutable) and singularities
 - (20 mins) 1020-1040: In-class exercises:
 - General Relativity in Virtual Reality (GRVR)
 - (10 mins) 10:40-10:50: Break
 - (25 mins) 10:50-11:15: Space making (composition, collage, culture, time)
 - (15 mins) 11:15-11:30: Watch [Paper Cutting Art Explores Physics & Philosophy](#), Sukanya Mani, TEDx St. Louis
 - (10 mins) 1130-1140: **Homework for next week:**
 - Schedule studio visits with the instructors. Sign-up sheet will be provided.
 - Take you artwork from week 2 homework and reimagine its aesthetics and/or concepts through the medium of paper. Be ready to share during scheduled studio visit.
 - Attend [Imagining Otherwise Symposium](#), Levis Faculty Center
 - Watch [How art, technology, and design inform creative leaders, Maeda](#)
- *The sandbox*. Iterative Process in Art and Physics

Week 5 – Seeing is Believing

- (50 mins) 9:00-9:50: Spectacular spectacles in physics; the observer and the observed
 - Seeing and hearing the universe
 - Event Horizon
 - Gravitational wave
 - Schrodinger’s cat: experimentalist affects the experiment.
- (10 mins) 9:50-10:00: Break
- (50 mins) 10:00-10:50: Spectacular spectacles in art; the observer and the observed
 - What art catches people’s attention?
 - What is a spectacle in art?
 - Can the art you generate be separated from the culture you live in?
- (40 mins) 10:50-11:30: In-class exercise: Burkean parlor – from controversial to canonical. Bring in a controversial object/subject that has many meanings and where meaning has changed through the years.

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- (10 mins) 11:30-11:40: **Homework for next week:**
 - Attend [PYGMAILION](#) (Astronomy on Tap, spoken work, musical performance, etc.)
 - Write a 300- to 500-word reflection on something you saw/heard/learned at PYGMAILION
 - Watch:
 - [“When Art and Physics Collide,” CERN](#)

Week 6 – Beg, Borrow, and Steal

- (30 mins) 9:00-9:30: Stealing (the right way)
 - *What makes work original versus derivative?*
 - *When is the work you’ve built upon sufficiently “new” or yours?*
 - *How do we cite, acknowledge, build, sample, collage toward our creative gesture?*
- (30 mins) 9:30-10:00: Ethics across art and physics
 - *How do we communicate, and do physics and art in an ethical way?*
 - How do we reconcile what is terrible today with what was acceptable before?
- (10 mins) 10:00-10:10: Break
- (25 mins) 10:10-10:35: Evolving technologies (Chat GPT, Midjourney, etc.)
 - *How do we utilize new technologies in art and physics?*
- (30 mins) 10:35-11:05: In-class exercise: As a class, develop a word bank of iconic themes across science and culture. Select a theme from that word bank and combine two found iconic images of culture, one closer on the spectrum to science and the other not, to create a new related or divergent statement.
- (25 mins) 11:05-11:30 Watch and discuss:
 - [“The beauty of Data visualization,” David McCandless](#)
- (10 mins) 11:30-11:40 **Homework for next week:**
 - Identify and collect an item(s), idea(s), or work(s) from beyond your field that embodies an element(s) that you’d like to “steal.” Be prepared to share why you chose the item(s), idea(s), or work(s) and how you hope it/they will advance your project.
 - Attend [CETACEAN](#), Stock Pavilion (Because it’s spectacular!)
 - Add “stolen” or “borrowed” songs to class playlist
 - Compose a draft of your written proposal. Review the assignment description for more details, but the main components of the proposal are the following:
 - *Description.* What are you going to create? How many of them? How big?
 - *Viability.* Will the piece hold together? Can you get it done in the time allotted? What do you need to achieve your vision? Technical details with studies and/or prototypes.
 - *Interdisciplinarity.* How will this piece connect art and physics? What interdisciplinary techniques will you employ?

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- *Artistic goals.* Why are you creating what you are creating?
What are you trying to communicate and for whom?
- Consider making an appointment with an instructor to discuss the details of your project proposal.

Week 7

- (50 mins) 9:00-9:50 In-class exercise: Share what you collected and explain what and how you might “steal” from it to further your own project.
- (10 mins) 9:50-10:00: Break
- (100 mins) 10:00-11:40 Proposal workshop
- **Homework for next week:** Finalize your proposal

Week 8 – Proposals

- (75 mins) 9:00-10:15 Proposal presentations and critiques
- (10 mins) 10:15-10:25: Break
- (75 mins) 10:25-11:40 Proposal presentations and critiques

Week 9 – Proposals

- (75 mins) 9:00-10:15 Proposal presentations and critiques
- (10 mins) 10:15-10:25: Break
- (75 mins) 10:25-11:40 Proposal presentations and critiques
- (time permitting) In studio work on final project

- *The castle*

Week 10 – Workshop

- In studio work on final project
- Begin drafting texts for final exhibit

Week 11 – Workshop

- In studio work on final project
- Group work on promotional materials and show description

Week 12 – Workshop

- In studio work on final project

Week 13 – Workshop

- In studio work on final project
- **Homework for next week:** Finalize all elements and be prepared to install your work on Monday, November 27th.

Week 14

Fall break (no class).

- *Exhibition and reflection*

Week 15

- Install exhibition, Monday Nov. 27th 9a-12p

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Week 16

- In-class viewing and reflection
- Reception Monday, Dec. 4th 5-7pm
- De-install exhibition Thursday, Dec. 7th from 9am-3pm



Siebel Center for Design

> GOOD CITIZENSHIP, ACCOMMODATIONS, AND SUPPORT

Academic Integrity

The University of Illinois at Urbana-Champaign *Student Code* should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: <http://studentcode.illinois.edu/>.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <http://studentcode.illinois.edu/>. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Students with Disabilities

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu. <http://www.disability.illinois.edu/>.

Emergency Response Recommendations

Emergency response recommendations can be found at the following website: <http://police.illinois.edu/emergency-preparedness/>. I encourage you to review this

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website and the campus building floor plans website within the first 10 days of class. <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>.

Family Educational Rights and Privacy Act (FERPA)

Any student who has suppressed their directory information pursuant to *Family Educational Rights and Privacy Act* (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <https://registrar.illinois.edu/academic-records/ferpa/> for more information on FERPA.

Sexual Misconduct Policy and Reporting

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.