# physics and art
# aka visual physics
# spring 2026

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csaapt, april 18, 2026 • university of delaware

# Physics and art?

In December, I was invited to teach a course at the Maryland Institute College of Art (MICA), Visual Physics.

This was an opportunity to create and instruct a course in the ‘physics of art.’

My talk will describe the results.

# What was I thinking?

As much as I love art (particularly film, sculpture, ceramics, pop art, and holography), I am not an artist.  I am a physicist (and also a musician).  I love the intersection of art and physics, and that is the approach I took in this class.  I wanted students to gain some physics knowledge that would inform their art.  So it was not the standard canon of physics topics.

Just as importantly, I wanted this course to be extremely hands-on.  It met once a week for nearly 3 hours, and each week students were to perform a lab.

# What was I thinking?

Though you may never teach such a class, I hope you gain an idea or two of:

- How to help your artistic students see physics as more useful than they initially expected
- How to help your science-minded students see art and physics as not mutually exclusive
- How to push students to be more creative in general

# What were my students studying at MICA?

Student majors included:

- Architecture
- Game design
- Graphic art
- Photography
- General fine arts
- Sculpture
- Animation
- Illustration
- Fiber/ceramics
- Sustainability

# Each class…

The class met once per week during the evening.  I would begin with an hour or so of background, demonstrations, and discussion.  After this, the students would be asked to complete a lab or activity.  Sometimes, these would be continued at home.

There was also a project, though it was pretty free-form.  Students had to explain something, discussing the background and physics of it.  The final work could be a paper, a slideshow, physical model, poster, etc.  These will be submitted shortly but topics include:  engines, Doppler effect, DSLR, wearable electronics…

# Topics and labs in the class

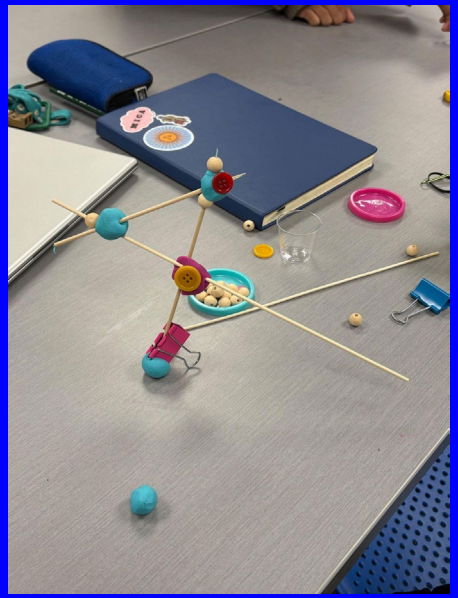
| Week | Topic | Lab |
|---|---|---|
| 1 | SI Units, Oscillations (Lissajous patterns) | No lab (I overprepared.) |
| 2 | Waves, harmonics, Chladni plates | Waves and harmonics |
| 3 | Sound and music | Constructing chords, “seeing sound” |
| 4 | Mirrors and reflection | Laser optics and patterns |
| 5 | Lenses and refraction | How lenses create images |
| 6 | Misc optics - diffraction, holography, Moiré, color, 3D | DIY images |
| 7 | The night sky | Kepler; night sky (birth) |

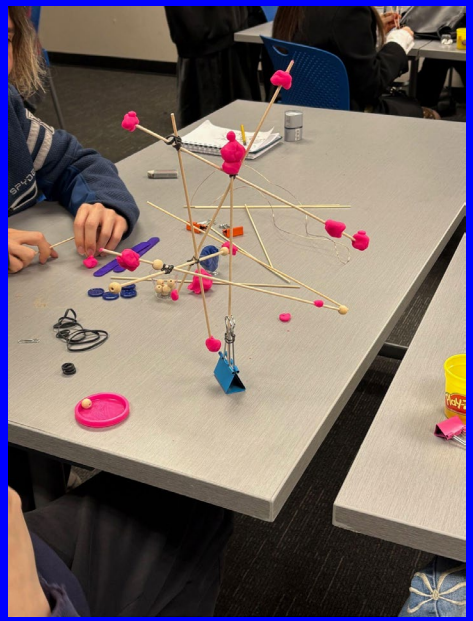
# Topics and labs in the class

| Week | Topic | Lab |
|---|---|---|
| 8 | Kepler’s laws; intro to torque (levers) | Balance (lever lab) |
| 9 | Center of gravity | Kinetic sculpture |
| 10 | Forces and equilibrium - 1 | Truss construction |
| 11* | Forces - 2; intro to special relativity | Trusses part 2 |
| 12 | Special relativity | Relativity simulation |
| 13 | Intro to circuits | Use of LEDs |
| 14 | Electromagnetism | Motors, speakers, etc. |

**I held an asynchronous class this week, due to being out of town.*

# The hits - kinetic sculpture lab





# The hits - kinetic sculpture lab

Students were provided with materials and were asked to build a balancing sculpture.  After this, they were to photograph it and estimate the CG location.

For homework, they had to print out a map of their favorite city, state, or country - then glue it to cardboard and find the CG (assuming a very unrealistic uniform population density).

# The hits - Optics and you

I asked the students to photograph instances of:

- Reflection
- Refraction

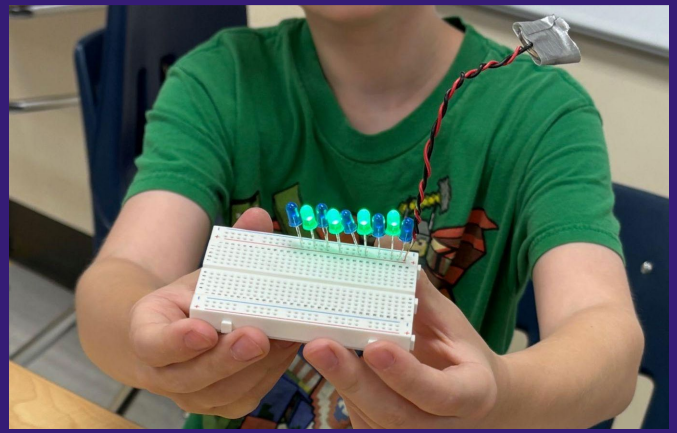
Much like the AAPT competition, the photos could be natural or contrived.  They could not be as trivial as taking a picture of themselves in a mirror.  There had to be some substance to what they were photographing.

Then they were asked to create a 3D image.  They had a good deal of flexibility in how to do this:  anaglyph, 2 images side-by-side with 3D viewer, etc.

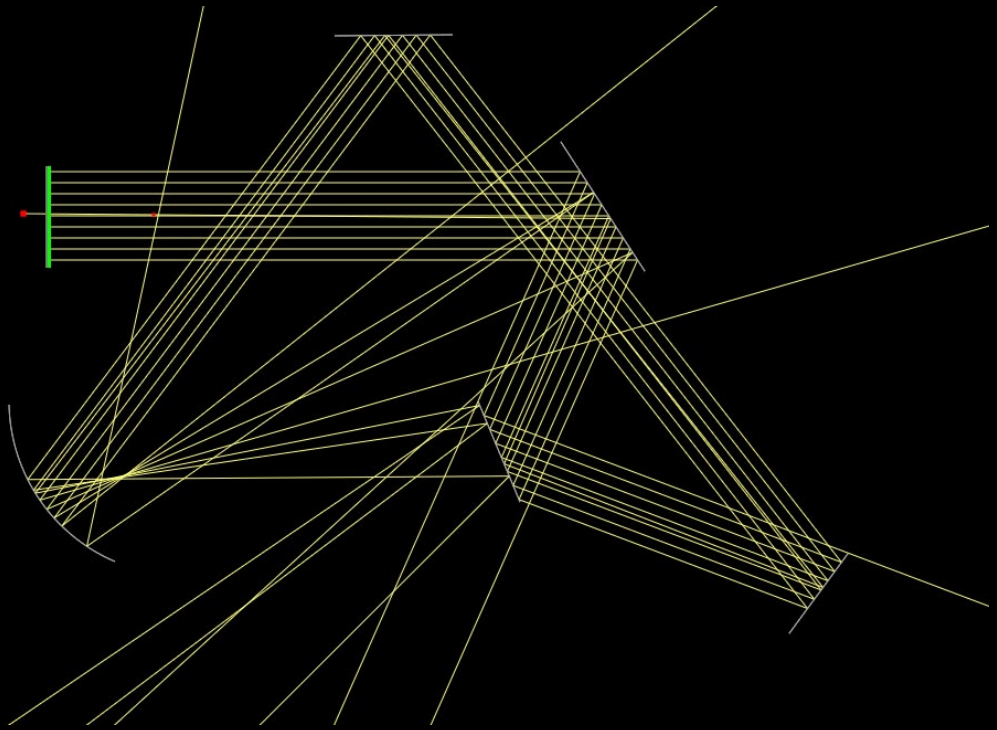
# The hits - Intro to electronics

Students learned to use LEDs, motors, and batteries to create basic circuits that could be used in their work.

Breadboards, wires, and LEDs go a long way…



# The hits - Ray optics

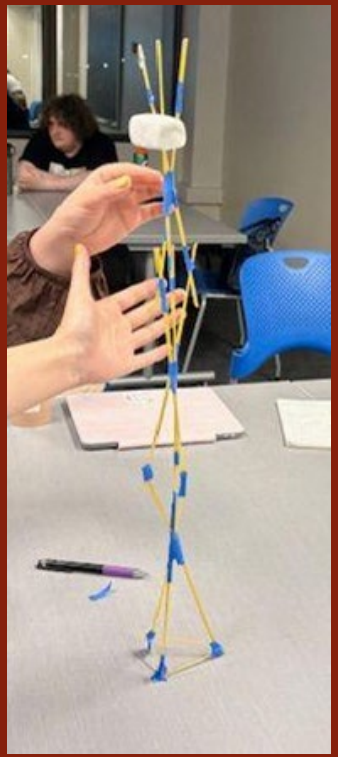


https://phydemo.app/ray-optics/simulator/

# The hits - Trusses and Towers

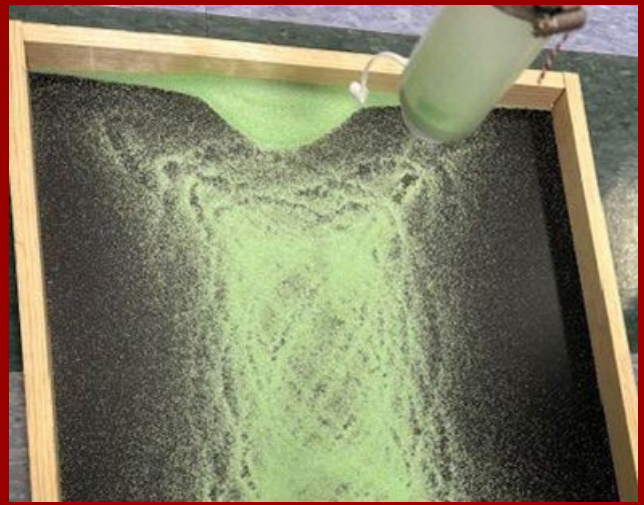
Students used simple materials to construct basic towers and trusses after some initial discussion of how forces can be distributed.

In addition, students used a truss design program to help them model their ideas.



# The hits - very popular demos

Chladni plates
Lissajous figures (coupled oscillators) with sand
Rubens Tube



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# More fun…

Several of my students had interest in science fiction and space science, so it made sense to take a class or two to chat about the night sky, as well as the reality behind science fiction.  Topics:

- The night sky, and finding your way around
- The night sky on the day of your birth
- Basic astrophotography and telescope use
- Special relativity and the reality of time travel
- Distinguishing science from pseudoscience

# Future activities…

Holography
Astrophotography
Sound triggered photography
Strobe photography
Mobiles
Larger trusses
Motion tracking (Phystracker)
Kinetic sculpture race?
Baja car?

# The takeaway…

This past semester, I have been asked the best questions of my teaching career. These students had been waiting for a safe place to ask about scientific things that interested them, without an onslaught of mathematics and baffling symbols (or that's how my artist daughter puts it).

# The takeaway…

Most of our students will not become scientists, engineers, or follow STEM careers.  It can be easy to get wrapped up in the esoteric nature of physics - maybe that is what drew some of us to it - but that often loses the interest of many students, and they no longer see it as something worth considering further.

Students find it worthwhile (and often exciting) to learn about the physics that is behind their own passions and interests.

*Thanks very much.*

*See you soon, see you on the Moon!*

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# Resources

https://phydemo.app/ray-optics/simulator/

https://phydemo.app/ray-optics/

https://onlinetonegenerator.com/

https://academo.org/demos/virtual-oscilloscope/

https://academo.org/demos/speed-of-light-visualizer/

https://astro.unl.edu/classaction/animations/renaissance/kepler.html

https://theskylive.com/3dsolarsystem

https://www.autoradstudio.com/builder/starmap.html

https://ei.jhu.edu/truss-simulator/

# Resources

https://www.fourmilab.ch/cgi-bin/Yoursky

https://huggingface.co/spaces/fffiloni/3D-Anaglyph-Image-Generator

https://www.andybaird.com/travels/skylarking/3d/viewer.htm

https://www.imgonline.com.ua/eng/stereoscopic-3d-picture-from-photo.php

https://phystracker.org/

https://www.youtube.com/watch?app=desktop&v=huOQOYkBs-g&pp=0gcJCcQBo7VqN5tD

https://calder.org/

*All images by the author*