

ASTRONOMY WORKSHOPS FOR ELEMENTARY/MIDDLE/HIGH SCHOOL STUDENTS

Description

The Physics and Astronomy Department at UCR has designed workshops for students following California's Common Core State Standards for science.

Through visual and spoken presentations the students will be exposed to astronomical themes, understand the objective of the activity, and then have a hands-on experience that will use and emphasize on STEM subjects.

Activities are also available for deaf and blind students.

English is the main language for the workshops, but upon request, we can deliver them in Spanish.

	Grade	Deaf	Blind
Workshops			
EXTRATERRESTRIAL LIFE [p. 2]	2 & 3	✓	
PRE-HISPANIC CONSTELLATIONS [p. 3]	5 & 6	✓	
STARS WITH ORIGAMI [p. 4]	5,6&8	✓	
SOLAR SYSTEM MOBILE [p. 5]	3 & 5	✓	
SMELLING THE UNIVERSE [p. 6]	8	✓	
TOUCHING THE UNIVERSE [p. 7]	8	✓	✓
SOUNDS OF THE UNIVERSE [p. 8]	8		✓
WATER ROCKET [p. 9]	8	✓	
SOLAR TELESCOPE OBSERVATIONS [p. 10]	3 & up	✓	
NIGHT TELESCOPE OBSERVATIONS [p. 11]	3 & up	✓	
ASTROPHOTOGRAPHY [p. 12]	10&up	✓	

If interested contact Dr. Mario De Leo at mariodlw@ucr.edu
Workshops must be requested 3 weeks in advance.



Description [20 min.]
We start with a brief computer-based presentation of the discovered extrasolar planets and the imagined colors of animals and plants depending on their host star's light emission.

[50 min.]
Hand-on experience strengthens learning experiences. We guide students to build their extraterrestrial life form imagined from the presentation.

Further reading: [Kiang, et al., 2008](#); [O'Malley-James, et al., 2012](#)

Requirements

- Video projector
- Projection screen
- Tables and chairs

Materials & Cost

\$3 for [clothespins](#) [link to buy ↗]
 \$18 for [colored pipe cleaners](#) [link to buy ↗]
 \$6 for [wiggly eyes](#) [link to buy ↗]
 \$13 for [colored tissue paper](#) [link to buy ↗]
 \$10 for [color markers](#) [link to buy ↗]
 \$31 for [24 scissors](#) [link to buy ↗]
 Total: \$81 for first 25 students, \$10 for additional 100

Students per session 20 to 30

ASTRONOMY
UCR



Description

We are accustomed to calling and knowing constellations by their classic Greek and Roman names, while most ancient civilizations also had their own deities and symbolisms assigned to stellar groups. A novel way to link Latino communities with their pre-Hispanic heritage can be achieved reimagining the sky of the Mayans and Mexicas.

[30 min.]

Brief talk on discoveries and interpretations of deities and stars on Mayan and Aztec codexes. Then printed star patterns will be handed out for students to create their own figures based on what they have learned on different interpretations throughout time and civilizations.

Further reading: [Mclvor, 2000](#); [Park & Chung, 2010](#)

Requirements

- Video projector
- Projection screen
- Tables and chairs
- Audio system

Materials & Cost

None

Students per session

20 to 30



Description

[15 min.]

Stars follow a "life cycle", they form in nebulae, shine using gas as fuel, and die. Astronomers infer the temperature and age of star by viewing its color. We start with a brief computer-based presentation of this cycle.

[45 to 60 min.]

Hand-on experience strengthens learning. We guide students to build their own star through origami [folding paper] using colors to characterize each type of star. They get to keep the star.

Requirements

- Video projector
- Projection screen
- Tables and chairs

Materials & costs

8 colored origami sheets per student
 \$15.00 for [500 sheets of origami paper](#) [link to buy ↗]

Students per session

20 to 30



Description

[15 min.]

We start with a brief computer-based presentation of the existing planets, some moons, asteroids, comets and the Sun.

[90 min.]

Hand-on experience strengthens learning. We guide students to build their own hanging mobile composed of the planets and elements of the Solar System.

Requirements

- Video projector
- Projection screen
- Tables and chairs

Materials & Cost

\$15 for 152 crayons/markers/colored pencils [\[link to buy ↗\]](#)

\$4.5 for 400 yards of thread [\[link to buy ↗\]](#)

\$14 for paper glue [\[link to buy ↗\]](#)

\$22 for one scissor per student [\[link to buy ↗\]](#)

\$10 for wooden dowels [\[link to buy ↗\]](#)

\$6 for scotch tape and dispenser [\[link to buy ↗\]](#)

Total: \$72 for first 25 students, \$20 for 100 more

Students per session

20 to 30



Description

Complex molecules have been detected throughout the Universe. Comets, the Milky Way's center, the atmosphere of Saturn's moon Titan, and outer space surrounding the International Space Station have smells which have been paired with foods and products found on Earth.

[40 min.]

Paired with a creative storytelling of the Universe, children will be asked to imagine the smells of wondrous formations and then handed out containers with the approximate smells of the atmospheres of Titan and Venus, the soil of Mars, the galactic center, the Moon, the space surrounding the International Space Station, and interstellar molecular clouds made with regular and safe household items.

Further reading: [Belloche, et al., 2008](#); [Belloche, et al., 2009](#); [Fecht \[Popular Science\]](#); [Schiffman \[Popular Science\]](#)

Requirements

- Video projector
- Projection screen
- Tables and chairs

Materials & Cost

\$15 for [sulphur powder](#) [[link to buy ↗](#)]

\$2 for vinegar

\$4 for [raspberry flavoring](#) [[link to buy ↗](#)]

\$5 for [rum flavoring](#) [[link to buy ↗](#)]

\$12 for charcoal

\$10 for beef jerky

\$30 for [6 plastic salt shakers](#) [[link to buy ↗](#)]

Total \$103 to set up for as many students as possible

Students per session

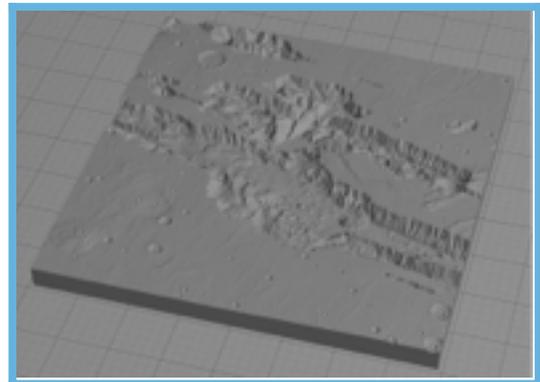
20 to 30

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Description	<p>The free availability of detailed 3D models of different asteroids, man-made spacecrafts, and Solar System terrains provide new tools for children to explore the immediate surrounding Universe. Pairing with NASA created braille books, the activity can extend its educational goal from the Solar System to deep space.</p> <p>[30 min.]</p> <p>Paired with a creative storytelling of the Universe, children will be asked to touch 3D printings of missions such as Voyager, New Horizons or the International Space Station, regions like the Marineris Valley in Mars, or asteroids from the local belt. Emphasis can be placed on describing the importance of discovering Near Earth Objets [NEOs] which can threaten Earth.</p>
Requirements	<ul style="list-style-type: none"> • Video projector • Projection screen • Tables and chairs
Materials & Cost	<p>\$600 for three 3D printed models</p> <p>\$400 published astronomy braille books [for the school]</p> <p>Total: \$1000</p>
Students per session	20 to 30

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Description

Either through the interpretation of frequencies from cosmic phenomena into audible sound waves or actual radio readings from different sources, the Universe can become an acoustic experience.

[40 min.]

Children sit and listen, asked on what they think they are hearing, astronomical descriptions ensue, and comparison with their surrounding world. Analogies will be drawn between everyday and cosmic sounds. Available material includes the Sun, Saturn's storms, interstellar plasma, the Earth's atmosphere, and material whirling into a black hole.

Requirements

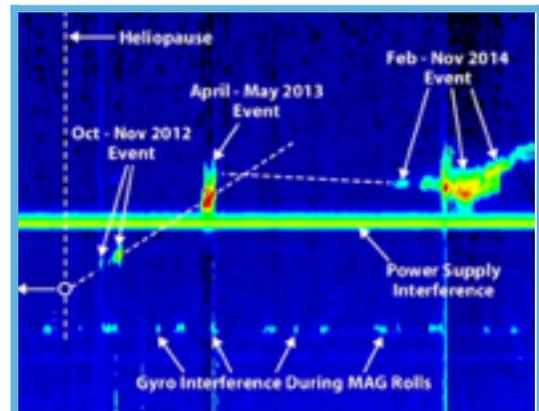
- Video projector
- Projection screen
- Tables and chairs
- Audio system

Materials & Cost

None

Students per session

20 to 30



Description

How do forces come together to send a rocket into space? Propulsion, drag and pressure are some of the concepts applied in the construction of a water powered rocket in a race to see who can send it higher.

[120 min.]

Brief talk on the physics involved on the water rocket construction and launch. Workshop for teams to build their own water rocket and the subsequent launching to see who produced the best design according to the laws of physics.

Requirements

- Video projector
- Projection screen
- Tables and chairs
- Audio system
- Open area for launch

Materials & Cost

\$2 Cardboard [\[link to buy ↗\]](#)

or \$12 Two corrugated plastic [\[link to buy ↗\]](#) sheets

\$20 Utility knives [\[link to buy ↗\]](#)

\$9 Duck tape [\[link to buy ↗\]](#)

Five 1 lt or 1.5 lt water bottles

\$3 Sewing measuring tape [\[link to buy ↗\]](#)

Total \$36 for 20 students

Students per session

20

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Description

The Sun gives us energy for everyday biological processes. our star has processes of its own: sun spots, mass coronal ejections, solar prominences. All are visible through our specialized H-Alpha and visible light filters for telescopes.

[20 min.]

Brief talk on solar phenomena to prepare students on what they are going to see through the telescope

[60 min.]

Solar observation though specialized filters.

Requirements

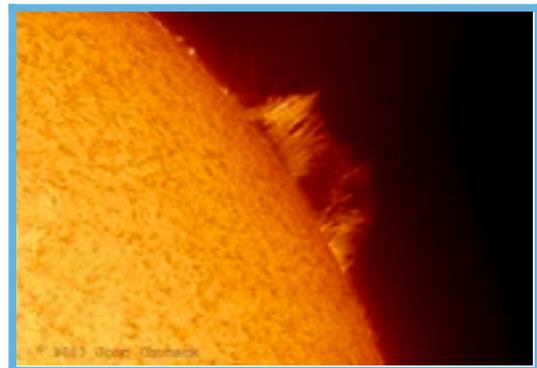
- Video projector
- Projection screen
- Tables and chairs
- Patio with clear horizons

Materials & Cost

None

Students per session

60 persons per hour per telescope
Three telescopes available



Description

Nebulae, open and globular clusters, the planets of the Solar System.

[20 min.]

Brief talk on the main astronomical objects available for observation that night to prepare students on what they are going to see through the telescope

[60 - 120 min.]

Observation through telescopes.

Requirements

- Video projector
- Projection screen
- Tables and chairs
- Patio with clear horizons
- Access to electric power

Materials & Cost

None

Students per session

60 persons per hour per telescope
Up to 3 telescopes per session



Description

How to photograph planets, star clusters and nebulae through a telescope.

[4 hours in 2 sessions]

Introduction talk on the use and workings of telescopes, cameras, astrophotography, image reduction and image processing.

[90 min.]

Astrophotography session [use of telescope and cameras]

Requirements

- Video projector
- Projection screen
- Tables and chairs
- Patio with clear horizons
- Access to electric power
- Two or three nights for practical and theoretical sessions

Materials & Cost

None

Students per session

4 persons per telescope
Up to 8 persons

