ASTRONOMY WORKSHOPS FOR ELEMENTARY/MIDDLE/HIGH SCHOOL STUDENTS

Description

The Physics and Astronomy Department at UCR has designed workshops for students following California’s Next Generation Science Standards (NGSS).

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.

<table>
<thead>
<tr>
<th>Workshops</th>
<th>Grade</th>
<th>Deaf</th>
<th>Blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRATERRESTRIAL LIFE [p. 2]</td>
<td>1 +</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>STARS WITH ORIGAMI [p. 3]</td>
<td>5 +</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>SOLAR SYSTEM MOBILE [p. 4]</td>
<td>3 +</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>SMELLING THE UNIVERSE [p. 5]</td>
<td>5 +</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SOUNDS OF THE UNIVERSE [p. 6]</td>
<td>5 +</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>WATER ROCKET [p. 7]</td>
<td>8 +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOLAR TELESCOPE OBSERVATIONS [p. 8]</td>
<td>3 +</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>NIGHT TELESCOPE OBSERVATIONS [p. 9]</td>
<td>3 +</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ASTROPHOTOGRAPHY [p. 10]</td>
<td>8 +</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

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

[20 min. talk] We start with a brief computer-based presentation of discovered extrasolar planets and the possible colors of animals and plants, as suggested by science, depending on their host star’s light emission.

[50 min. experience] Hands-on experience strengthens learning. We guide students to build their extraterrestrial life form following knowledge acquired from the presentation.

Further reading: Kiang, et al., 2008; O’Malley-James, et al., 2012


School facilities

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

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### Description

[15 min. talk] 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 and examine what each color tells scientists about stars.

[60 min. experience] Hands-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.

Further reading: stellar classification

NGSS Fifth grade: ESS1.A; ESS1.B; PS1.A.

### School facilities

- 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
The activity is suggested for 3rd graders and up, although material was covered during 1st grade.

[15 min. talk] We start with a brief computer-based presentation of the Sun, planets, major moons and their characteristics.

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

Related to material seen in:
NGSS Fifth grade: ESS1.A; ESS1.B; PS1.A.

School facilities
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
SMELLING THE UNIVERSE

Fifth Grade and Above

Complex molecules have been detected throughout the Universe. The Moon, the Milky Way’s center, the atmosphere of Mars, and the International Space Station (ISS) have smells which have been paired with foods and products found on Earth.

[15 min. talk] We start with a brief computer-based presentation of cosmic phenomena (moons, galaxies, planets).

[45 min. experience] Students will be asked to imagine the smells of wondrous cosmic phenomena and then handed out containers with the approximate smells of Mars, the galactic center, the Moon, and the ISS, smells are produced with regular and safe household items.

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

NGSS Fifth grade: ESS1.A; ESS1.B; PS1.A; PS1.B.
NGSS Eight grade: ESS1.A; ESS1.B.
NGSS Ninth grade: ESS1.A; ESS1.B.

School facilities
Video projector, projection screen, tables and chairs

Materials & Cost
$2 for vinegar
$4 for raspberry flavoring [link to buy]
$5 for rum flavoring [link to buy]
$12 for charcoal
$10 for beef jerky
Total $90 to set up for as many students as possible

Students per session
20 to 30

The centre of the Milky Way galaxy smells like raspberries and tastes like rum.

ASTRONOMY
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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. Talk] Students sit and listen cosmic sounds, and are 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, Earth’s atmosphere, the temperature of the Universe, etc.

NGSS Fifth grade: ESS1.A; ESS1.B.

School facilities

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

Materials & Cost

None

Students per session

20 to 30
WATER ROCKET

Eighth Grade and Above

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.

[20 min. talk] Brief talk on the physics involved on the water rocket construction and launch (drag, gravity, propulsion, forces).

[100 min. experience] Teams build their own water rocket and the subsequent launching to see who produced the best design according to the laws of physics.

NGSS Tenth grade: PS2.A; PS2.B.
NGSS Eleventh grade: PS3.A; PS3.B.

School facilities

Video projector, projection screen, tables and chairs, audio system and open area for launch.

Materials & Cost

$2 Cardboard [link to buy] or $12 Two corrugated plastic [link to buy] sheets
$20 Utility knifes [link to buy]
$9 Duck tape [link to buy]
Five 1 lt or 1.5 lt water bottles
Total $36 for 20 students

Students per session

20
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. The activity is suggested for 3rd graders and above, although material was covered during 1st grade.

[20 min.]
Brief talk on solar phenomena to prepare students on what they are going to see through the telescope

[40 - 60 min.]
Solar observation through specialized filters.

NGSS Fifth grade: ESS1.A; ESS1.B; PS1.A.
NGSS Ninth grade: ESS1.A; ESS1.B.

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

Materials & Cost
None

Students per session
60 persons per hour
NIGHT TELESCOPE OBSERVATIONS

Third Grade and above

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.

NGSS Fifth grade: ESS1.A; ESS1.B; PS1.A.

School facilities

- 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

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# ASTROPHOTOGRAPHY

## Eight Grade and above

### Description

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

[4 hours in 2 sessions]

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

[90 min. at night]

**Practical astrophotography session** [use of telescope and cameras].

NGSS Ninth grade: ESS1.A; ESS1.B.  
NGSS Tenth grade: PS2.B.  
NGSS Eleventh grade: PS3.A.  

### School facilities

- Video projector
- Projection screen
- Tables and chairs
- Patio with clear horizons
- Three nights for practical and theoretical sessions

### Materials & Cost

None

### Students per session

- 4 persons per telescope  
- Up to 8 persons

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**ASTRONOMY**

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