



# Palo Alto Junior Museum and Zoo

## NGSS Aligned Classes Offered 2017 –18

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- \* Requires two class periods.
- † Parent volunteers required.
- ‡ Large open room required.



## Palo Alto Junior Museum and Zoo NGSS Classes Offered – Kindergarten

|                         | <b>Lesson</b>                      | <b>Description</b>   | <b>Performance Expectations*</b> |
|-------------------------|------------------------------------|--|----------------------------------|
| <b>Life Science</b>     | <b>Rainforest Biome</b>            | Students will learn about what makes a rainforest unique. They will smell and taste food products and be introduced to real rainforest flora and fauna. <i>Please advise instructor of any allergies in advance.</i>   | K-ESS2-2<br>K-ESS3-1<br>K-PS3-1  |
|                         | <b>Riparian Biome</b>              | Students will learn about what makes the riparian biome unique. They will create a scientific model of a river corridor habitat and meet some riparian flora and fauna.  | K-LS1-1<br>K-ESS3-1<br>K-PS3-1   |
|                         | <b>Mini-Habitats</b>               | Students will learn about what most animals need to survive. In groups, students will build a temporary terrarium to maintain and observe in the classroom.  | K-LS1-1<br>K-ESS3-1              |
|                         | <b>Zoo Animal Program</b>          | Students will meet a variety of different animals from the Junior Museum and Zoo. The lesson could include a general overview, or a focus on a specific group, such as reptiles, mammals, insects, etc. <i>If you have a special request, please speak with the instructor.</i>                    | K-LS1-1                          |
| <b>Earth Science</b>    | <b>Thermometers</b>                | Students will use various types of thermometers and learn about their value as a scientific measuring tool. Students will use these tools to measure and compare the temperature of various locations in the area.   | K-ESS3-2<br>K-PS3-1              |
|                         | <b>Solar Lab</b>                   | Students will experiment with a variety of materials to measure their effect on the transmission of light on an area.  | K-PS3-2                          |
| <b>Physical Science</b> | <b>Roller Coasters</b>             | Students will discover the effects of gravity's pull on the motion of marbles through experimenting with different configurations of roller coaster tracks.  | K-PS2-1                          |
|                         | <b>Straw Launchers</b>             | Students will manually adjust the strength and direction of an air launcher to conduct an investigation comparing the effects of these variables on the motion of straw rockets. <i>Straw Launchers requires a large empty indoor space approx. 30ft by 30ft.</i>                                  | K-PS2-1<br>K-PS2-2               |
|                         | <b>Testing Catapults</b>           | Students will experiment with different catapult variables to observe how their configurations affect the strength and direction on the motion of an object. <i>Testing Catapults requires a large empty indoor space approx. 30ft by 30ft.</i>  | K-PS2-1<br>K-PS2-2               |
|                         | <b>ENGINEERING - Paper Bridges</b> | In this two-part introduction to the engineering process, students will learn how to manipulate paper to increase its strength. They will work in groups building paper bridges, testing them, and then redesigning and retesting based on their new knowledge. <i>Requires two class periods.</i> | K-2-ETS1                         |

\* Our classes are designed to align, but not necessarily fulfill the listed Next Generation Science Standards' grade level Performance Expectations.

For a description of the listed standards, please visit - <http://www.nextgenscience.org/search-standards>



## Palo Alto Junior Museum and Zoo NGSS Classes Offered – 1<sup>st</sup> Grade

|                         | <b>Lesson</b>                   | <b>Description</b>  | <b>Performance Expectations*</b> |
|-------------------------|---------------------------------|---|----------------------------------|
| <b>Life Science</b>     | <b>Adaptations</b>              | Students will use their own bodies in a simulation to experience how animals physical traits and behavior affect their survival. Students will also meet a zoo animal and discuss its adaptations.  | 1-LS1-2                          |
|                         | <b>Bats</b>                     | Students will learn about senses, light and sound, echolocation, mammalian parent/offspring relationships, and animal survival as exemplified by pictures, artifacts, and a live bat from the zoo.  | 1-LS1-2<br>1-PS4-1               |
|                         | <b>Variation of Traits</b>      | Students will discover the similarities and differences between individuals of a species by observing live insects and animal artifacts.  | 1-LS3-1                          |
|                         | <b>ENGINEERING - Biomimicry</b> | In this two-part engineering lesson, using live carnivorous plants as a model, students will observe and mimic the methods these plants use to capture their prey in order to design a hex-bug trap. <i>Requires two class periods. Only available Sept-Oct and Apr-June.</i> | K-2-ETS1<br>1-LS1-1              |
| <b>Earth Science</b>    | <b>Starlab Planetarium</b>      | Students will learn about the patterns of the night sky by entering a portable planetarium and observing our local stellar neighborhood. <i>Starlab requires a large indoor empty space measuring 20 feet in diameter and 11 feet high.</i>                                   | 1-ESS1-1                         |
|                         | <b>Orbits</b>                   | Students will explore the patterns of motion of planets and stars using marbles and funnels as a model for orbital motion.  | 1-ESS1-1                         |
| <b>Physical Science</b> | <b>Illumination</b>             | Students will make observations using light and mirrors in a darkened space to discover that objects can be seen only when illuminated.   | 1-PS4-2                          |
|                         | <b>Lasers and Mirrors</b>       | Students will use lasers, mirrors and various objects to discover that light interacts with materials and can be directed, reflected, transmitted and absorbed.   | 1-PS4-3                          |
|                         | <b>Sound Explorations</b>       | Students will perform various investigations to explore the relationship between vibrating materials and sound.   | 1-PS4-1                          |

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## Palo Alto Junior Museum and Zoo NGSS Classes Offered – 2<sup>nd</sup> Grade

|                         | Lesson                              | Description  | Performance Expectations*      |
|-------------------------|-------------------------------------|--|--------------------------------|
| <b>Life Science</b>     | <b>Plants of Different Habitats</b> | Students will make observations of real plants from different biomes to compare the diversity of life in different habitats.   | 2-LS4-1                        |
|                         | <b>ENGINEERING - Seed pods</b>      | In this two-part engineering lesson, students will learn about the needs and challenges plants face in reproduction. Students will then build and test their own individual seed dispersal designs. <i>Requires two class periods.</i> | K-2-ETS1<br>2-LS2-2<br>2-PS1-2 |
| <b>Earth Science</b>    | <b>Volcanoes and Igneous Rocks</b>  | Students will discover how Earth events can occur both quickly and slowly through the phenomena of volcanoes and igneous rock. They will handle and identify a variety of real rock specimens.   | 2-ESS1-1                       |
|                         | <b>Weathering and Erosion</b>       | Students will learn about how Earth structures break apart and move. They will create a model demonstrating how water erodes sand.   | 2-ESS1-1<br>2-ESS2-1           |
| <b>Physical Science</b> | <b>Making Recycled Paper</b>        | Students will discover how the many small fibers that make up plants are removed and rearranged to form paper. Students will take deconstructed scrap paper and recycle it into new paper. <i>Parent volunteers required.</i>          | 2-PS1-3                        |
|                         | <b>Viscosity</b>                    | Students will learn about the physical property of liquids known as "viscosity". They will perform an experiment and record data in order to determine the viscosity of several different liquids.                                     | 2-PS1-1                        |
|                         | <b>Phase Changes</b>                | Students will learn about how a substance can change from one phase to another. They will perform an investigation and observe examples of phase change.   | 2-PS1-1<br>2-PS1-4             |

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## Palo Alto Junior Museum and Zoo NGSS Classes Offered – 3<sup>rd</sup> Grade

|                         | Lesson                            | Description  | Performance Expectations*                |
|-------------------------|-----------------------------------|--|--|
| <b>Life Science</b>     | <b>Bee Society</b>                | Students will learn about honey bees and their unique behavior and social life. They will see artifacts, taste honey, and observe specimens under microscopes.   | 3-LS2-1<br>3-LS1-1                       |
|                         | <b>Camouflage</b>                 | Students will perform an experiment and collect data in order to demonstrate that animals with better camouflage are more likely to survive. Students will also meet a live animal that is a master of camouflage.   | 3-LS4-3<br>3-LS3-1<br>3-LS3-2<br>3-LS4-2 |
|                         | <b>Fossils</b>                    | Students will handle a variety of real fossils and learn about their value as evidence of organisms and environments from Earth's distant past.  | 3-LS4-1                                  |
| <b>Earth Science</b>    | <b>Weather Instruments</b>        | Students will build various weather instruments and learn how they are used to monitor the weather. These tools will remain in the classroom for long term data collection.  | 3-ESS2-1                                 |
|                         | <b>Storms</b>                     | Students will learn about severe weather events that occur in different climates of the world and what causes them. The lesson will focus on tornados, lightning, and hurricanes.  | 3-ESS2-2                                 |
|                         | <b>Sand Erosion Mitigation</b>    | Students will use a variety of materials (natural and man-made) to experiment in mitigating wind erosion.  | 3-ESS3-1                                 |
| <b>Physical Science</b> | <b>Bouncing and Rolling</b>       | Students will conduct a scientific experiment and record and analyze data in order to discover what makes an object bounce and roll.   | 3-PS2-2                                  |
|                         | <b>Magnets</b>                    | Students will perform a variety of activities using magnets to observe that magnetic fields extend past the boundaries of the magnet itself.   | 3-PS2-3<br>3-PS2-4                       |
|                         | <b>Static</b>                     | Students will learn how electricity is present in more than just electronics. They will perform static experiments and interact with a Van de Graaff generator.  | 3-PS2-3                                  |
|                         | <b>ENGINEERING - Marble Paths</b> | In this two-part lesson, students will work in groups to design and build a marble ramp in order to meet a specific challenge. They will learn about energy and forces. Students will need substantial time in class between lessons to work on their projects. <i>Requires two class periods.</i> | 3-5-ETS1<br>3-PS2-2                      |

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## Palo Alto Junior Museum and Zoo NGSS Classes Offered – 4<sup>th</sup> Grade

|                         | Lesson                                       | Description  | Performance Expectations*        |
|-------------------------|--|--|----------------------------------|
| <b>Life Science</b>     | <b>Squid Dissection</b>                      | Students will learn about squid internal and external morphology by dissecting real squid specimens.   | 4-LS1-1                          |
|                         | <b>Eye Dissection</b>                        | Students will learn to identify the major parts of the mammalian eye and describe the process in which our sense of sight works. They will dissect and examine real cow eyes. <i>Parent volunteers needed.</i> | 4-LS1-1<br>4-LS1-2<br>4-PS4-2    |
|                         | <b>Lung Model</b>                            | Students will learn about the mammalian respiratory system and construct an interactive model of the lungs and diaphragm.  | 4-LS1-1                          |
| <b>Earth Science</b>    | <b>Rock Identification</b>                   | Students will learn about the rock cycle and how to accurately identify rocks by their scientific category.  | 4-ESS1-1                         |
|                         | <b>Sand Investigation Lab</b>                | Students will learn about the diversity of sand across the Earth. They will use microscopes and careful observation to explore the color, size, and special properties of sand.                                | 4-ESS2-1                         |
|                         | <b>ENGINEERING - Earthquake Construction</b> | In this two-part lesson, students will learn about earthquakes, in order to design, test, and redesign/re-test a model building to withstand the shaking of the Earth. <i>Requires two class periods.</i>      | 3-5-ETS1<br>4-ESS1-1<br>4-ESS3-2 |
| <b>Physical Science</b> | <b>Potential vs. Kinetic Energy</b>          | Students will learn about mechanical energy and its two forms. Each student will create a toy that is powered by elastic potential energy.   | 4-PS3-1<br>4-PS3-2<br>4-PS3-4    |
|                         | <b>Chemical Energy</b>                       | Students will learn about how chemicals can be used to make things work. They will perform some chemical reactions and observe the energy released in the process.   | 4-ESS3-1                         |
|                         | <b>ENGINEERING - Wind Power</b>              | In this two-part lesson, students will work in groups to design, build, and test a wind powered mechanism with the goal of lifting an object. <i>Requires two class periods.</i>                               | 3-5-ETS1<br>4-PS3-4              |

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## Palo Alto Junior Museum and Zoo NGSS Classes Offered – 5<sup>th</sup> Grade

|                         | Lesson                                     | Description  | Performance Expectations*      |
|-------------------------|--|--|--------------------------------|
| <b>Life Science</b>     | <b>Plankton Exploration</b>                | Students will learn about plankton to discover how the biosphere, atmosphere, and climate interact.  | 5-LS2-1<br>5-ESS2-1<br>5-PS3-1 |
|                         | <b>Carnivorous Plants</b>                  | Students will be introduced to several real carnivorous plants and learn how they differ from other plants. They will record observations on each plant to determine how they capture their prey. <i>Only available Sept-Oct and Apr-June.</i>   | 5-LS1-1<br>5-LS2-1             |
| <b>Earth Science</b>    | <b>Water Pollution</b>                     | Students will learn about the Earth's fresh water and how so much of it becomes polluted. Students will create their own model of polluted water.  | 5-ESS2-2                       |
|                         | <b>Water Filtration</b>                    | Students will learn about how we treat polluted water to make it safe for consumption. Students will learn to filter polluted water using real-world techniques.   | 5-ESS3-1                       |
|                         | <b>ENGINEERING - Submarines</b>            | In this two-part lesson, students will explore the concept of buoyancy as they build, modify, and test individual small submarines. Each student will keep their submarine. Substantial class time is needed between lessons to test materials for their projects. <i>Requires two class periods.</i>            | 3-5-ETS1<br>5-PS2-1            |
| <b>Space Systems</b>    | <b>Starlab Planetarium</b>                 | Students will learn about stars, including their size, temperature, and color. The entire class will enter a portable planetarium to learn about our local stellar neighborhood and seasonal patterns in the night sky. <i>Starlab requires a large indoor empty space 20 feet in diameter and 11 feet high.</i> | 5-ESS1-1<br>5-ESS1-2           |
|                         | <b>The Reasons for the Seasons</b>         | Students will conduct an investigation using a scientific model of the Earth-Sun system to understand the annual pattern of seasons. Students will record measurements and generate an argument for how Earth's axis and orbit generate the seasons.   | 5-ESS1-2<br>5-PS2-1            |
|                         | <b>Solar Ovens</b>                         | Students will discuss the many forms of energy and Earth's primary energy source, the sun. Each student will build a mini solar cooker to keep. These ovens will remain in the classroom for post-lesson use.  | 5-ESS1-2<br>5-PS3-1            |
| <b>Physical Science</b> | <b>Periodic Table, Atoms and Molecules</b> | Students will learn about the different elements and how they combine to form the world around us. Students will create models of common molecules.  | 5-PS1-1                        |
|                         | <b>Conservation of Mass</b>                | Using highly accurate scales, students will investigate various experiments testing the law of conservation of mass.   | 5-PS1-2<br>5-PS1-4             |
|                         | <b>Mineral Identification</b>              | Students will use scientific instruments to measure and calculate density and assess other properties in order to differentiate and identify specific mineral samples.   | 5-PS1-3                        |
|                         | <b>White Powder Identification</b>         | Students will chemistry to analyze several properties (such as pH and solubility) of various white powdered kitchen chemicals and use their new knowledge to identify a "mystery" white powder.  | 5-PS1-3                        |

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## Palo Alto Junior Museum and Zoo Classes Offered – FIELD TRIPS

| Outdoor Lesson<br>and Locations   | Description   |
|---|---|
| <b>Explore the Salt Marsh</b><br><br>at Palo Alto Baylands                                    | <p>Students discover the inner workings of the salt marsh ecosystem through exploration of microorganisms, plants, birds, and fish in this exciting hands-on program. Go birding to discover the amazing adaptations of our bay birds; spend time in the lab learning about the microscopic life at the base of this ecosystem; discover unique plants that are adapted to living in the salt marsh.</p> <p><b>Grade Levels:</b> 1st through 6th grade (max 30 students plus 1 chaperone per 5 students). Fishing available for 3rd - 6th graders.<br/> <b>Time:</b> 1-3 hours (2.5 hour minimum with fishing)<br/>           NGSS Disciplinary Core Ideas: LS1.C, LS2.A, LS2.B, LS4.C, LS4.D, ESS2.A, ESS2.C</p> |
| <b>Amazing Life of Birds</b><br><br>at Palo Alto Baylands                                     | <p>Bay birds offer an opportunity for experiential discovery of food chains, ecosystems, and adaptations. Students head outside with binoculars to study bay birds in their natural habitat, play a game of bird beak buffet to understand the importance of beak adaptations, and inspect and discuss our authentic collection of wings, feathers, skulls, and bird mounts with an experienced naturalist.</p> <p><b>Grade Levels:</b> 1st through 6th grade (max 30 students plus 1 chaperone per 5 students)<br/> <b>Time:</b> 2 Hours<br/>           NGSS Disciplinary Core Ideas: LS1.A, LS1.D, LS2.D, LS3.B, LS4.B, LS4.D</p>   |
| <b>Unlock the Secrets of the Foothills</b><br><br>at Foothills Park<br>or<br>Arastradero Park | <p>Soak up the sights, sounds, and smells of the local foothills on an engaging mile hike through beautiful natural parklands. Students take on the role of nature detectives and search for clues to discover the secrets of oak woodland, chaparral, riparian, or grassland ecosystems.</p> <p><b>Grade Levels:</b> 1st through 6th grade (max 30 students plus 1 chaperone per 5 students)<br/> <b>Time:</b> 2 Hours<br/>           NGSS Disciplinary Core Ideas: LS1.A, LS2.A, LS2.C, LS4.D, ESS2.A, ESS2.E</p>   |
| <b>Can You Survive as an Ohlone?</b><br><br>at Foothills Park                                 | <p>Wake up to a day filled with fire-making drills, acorn grinding, stories, and Ohlone games. Students will experience life as an Ohlone child by reenacting their daily activities at our 'trailside village'. End the day with a mile hike to a lake to twist cattails into cordage.</p> <p><b>Grade Levels:</b> 3rd through 5th grade (max 24 students plus 1 chaperone per 5 students)<br/> <b>Time:</b> 2 ½ Hours<br/>           NGSS Disciplinary Core Ideas: LS2.D, LS4.D, ESS2.E, ESS3.A, ESS3.C</p>   |

For more information about outdoor programs, contact 650-329-2506 or [naturalist@cityofpaloalto.org](mailto:naturalist@cityofpaloalto.org)

|  |   |
|--|---|
| <b>Junior Museum &amp; Zoo Visit</b><br><br>at Palo Alto Junior Museum and Zoo | <p>Bring your students to our onsite classroom for a standards-based science lesson of your choice and stay to enjoy the museum, zoo, and nearby park afterwards. Alternatively, school groups may schedule a self-guided field trip with a low per person fee.</p> <p><b>Grade Levels:</b> pre-K through 5th grade (max 24 students plus 1 chaperone per 5 students)</p> |
|--|---|

Advance registration for group museum visits is required. Please call: 650-329-2111.





# Palo Alto Junior Museum and Zoo

## Science Program Fees

### 2017 – 18

#### School Programs

| Number of Programs | Resident Fee | Per Program | Non-Resident Fee | Per Program |
|--------------------|--------------|-------------|------------------|-------------|
| 1                  | \$164        | \$164       | \$189            | \$189       |
| 2                  | \$311        | \$156       | \$357            | \$179       |
| 3                  | \$458        | \$153       | \$527            | \$176       |
| 4                  | \$604        | \$152       | \$695            | \$173       |
| 5                  | \$751        | \$150       | \$864            | \$172       |
| 6                  | \$898        | \$150       | \$1,032          | \$172       |
| 7                  | \$1,045      | \$149       | \$1,202          | \$171       |
| 8                  | \$1,191      | \$149       | \$1,370          | \$171       |
| 9                  | \$1,338      | \$149       | \$1,539          | \$171       |
| 10                 | \$1,409      | \$141       | \$1,620          | \$162       |
| 11                 | \$1,543      | \$141       | \$1,775          | \$161       |
| 12                 | \$1,678      | \$140       | \$1,930          | \$161       |
| 13                 | \$1,813      | \$140       | \$2,086          | \$161       |
| 14                 | \$1,949      | \$140       | \$2,240          | \$160       |
| 15 or more         | -            | \$139       | -                | \$160       |

#### Field Trips

| Field Trip                          | Program Length | Resident Fee | Non-Resident Fee |
|-------------------------------------|----------------|--------------|------------------|
| Explore a Salt Marsh (with fishing) | 2.5 hours      | \$295        | \$325            |
|                                     | 3 hours        | \$355        | \$390            |
|                                     | 1 hour         | \$164        | \$189            |
| Explore a Salt Marsh (no fishing)   | 2 hours        | \$240        | \$275            |
|                                     | 2.5 hours      | \$275        | \$315            |
|                                     | 3 hours        | \$315        | \$360            |
| Can You Survive as an Ohlone?       | 2.5 hours      | \$315        | \$365            |
| Unlock the Secrets of the Foothills | 2 hours        | \$240        | \$275            |
| Amazing Life of Birds               | 2 hours        | \$240        | \$275            |
| Museum Visit, self-guided           | *              | -            | \$5 per child    |
| Museum Visit with classroom lesson  | *              | \$164        | \$189            |

\*for museum visits, program length varies. Call 650-329-2111 for details.