

BGSU PLANETARIUM TEACHER'S GUIDE (2022-2023)

Contents

page 1	Background information: <i>What is a planetarium?</i> <i>Who should use the planetarium?</i> <i>Types of programs</i>
page 2	Practical information: <i>Using the planetarium effectively</i> <i>How to arrange a visit</i>
page 3	Live programs
page 4	Workshop-style programs
page 5	Full-dome programs
page 14	Classic multimedia programs
page 25	Map



Welcome to our new 2022-2023 Teacher's Guide! We have now installed a state-of-the-art full-dome video projection system, whose video fills the entire dome, and have added a large number of full-dome programs to our roster of available shows.

Our programs cover all grade levels from pre-school to college. In each, we are committed to providing a high-quality educational experience for you and your class. We look forward to serving you.

What is a Planetarium?

A planetarium is a theatre of the Universe. It can surround you with an accurate image of the sparkling night sky. It can show all the motions and cycles of the sky. Our full-dome shows surround you with video that fills the entire dome and immerses you in the cosmos in a way that no other medium can. Our classic shows use hundreds of still images to create a multi-media experience with images, video, visual effects, computer animations, narration, and music that reveal the wonders of the cosmos to you and your class. It will introduce your students to a lifelong acquaintance with the sky and the Universe.

Who Should Use the Planetarium?

Classes studying astronomy should visit the Planetarium. Ideally, a student should make several visits over the years to experience a broad range of programs. We also encourage students and parents to attend our public shows in the evening.

Many of our programs are interdisciplinary in nature and can enrich classes not only in the other sciences (*e.g.*, earth science and biology), but also in history, geography, and study of various cultures.

Types of Programs

You can choose from four main types of programs:

- (1) Full-dome video program — The presentation of one of our full-dome video programs with a live introduction and a question-and-answer time at the end.
- (2) Multimedia program — The presentation of one of our classic multimedia shows with a live introduction and a question-and-answer session at the end.
- (3) Live program — a live interactive presentation on a selected topic using the star projector or video system focused on the sky; can usually be adapted to the specific needs of your class.
- (4) Workshop program — an interactive lab-style study of selected sky motions.

***** PRACTICAL INFORMATION *****

Using the Planetarium Effectively

We see the planetarium as a resource to help you teach astronomy and as a means to convey the excitement of astronomy and the sciences and to attract student interest in these topics. We want the visit of your class to be a stimulating and educational experience. When you call to arrange a visit, please let us know any questions you have. This will help us assure the best possible program for your class.

Some helpful pointers include:

- * A planetarium visit is most valuable when it is integrated with the regular classroom syllabus. The visit should generally be made after students have studied the related material in class, especially for the younger grades.
- * We strongly urge preparatory and follow-up activities to prepare the students and to build on the interest the visit promotes.
- * The planetarium visit can be used to extend the classroom unit. Don't necessarily choose the program that most completely overlaps your curriculum. Consider also a program that expands on just part of your unit or that extends the unit in a new direction.

How to Arrange a Visit

Arranging a visit to the planetarium is simple. Contact the Director, Dr. Dale Smith, by phone (419) 372-8666 or email dwsmith@bgsu.edu to select a specific program and secure a date and time for the visit. You can also check the planetarium's web site at <http://physics.bgsu.edu/planetarium>. School programs are done anytime on Tuesdays and Thursdays during BGSU's fall and spring semesters. Other weekdays are available during final exam week. We are usually booked to capacity late in the semester, especially spring, so it is wise to reserve well in advance and, if possible, to select times earlier in the semester.

Our price is \$1 per person for all programs. Groups must meet the following minimum totals: \$20 for a daytime show, \$25 for an evening show, \$50 for a Saturday or Sunday show.

You can also reserve two programs for your group to create a two-hour visit; the price for this option is \$2 per person. If you reserve two multimedia programs, you can do one program before lunch and another after lunch.

Finally, we note that the Planetarium is an expensive room with a busy schedule; therefore, all groups must arrive on time and strict discipline must be maintained at all times. Food and beverage are prohibited in the Planetarium at all times. The use of cell phones, flashing shoes, and flash photography are prohibited at all times during shows.

***** **LIVE PROGRAMS** *****

These programs are live interactive presentations pitched to the grade level of your class. All involve student participation. The emphasis is on the sky and on demonstrations that use equipment unique to the planetarium rather than on lessons that could also be done in the regular classroom.

In order to encourage student involvement, the maximum group size for live programs is about 55 students (two classes), except for preschool through grade 1, where the maximum is about 25 students (one class).

Live programs are about one hour long, including an introduction to the planetarium and time for questions at the end.

STAR SHAPES (Preschool and kindergarten): An introduction to the planetarium and the sun and stars, using a format of storytelling, activities, and a look at the planetarium's starfield. *Maximum 20 students. (30 minutes)*

DAY AND NIGHT (Grade 1): An explanation of day and night. The sun's motion across the sky is shown and the concept that it moves because the earth rotates is demonstrated. Then, the current evening sky and some constellations are shown. (30 minutes)

FIRST CONSTELLATIONS (Grade 1): An introduction to constellations for first graders. (30 minutes)

DIRECTIONS (Grade 2): A demonstration of the meaning of directions: east and west as the directions of sunrise and sunset, south as the direction of the midday Sun, and north as the direction of the pole star. The seasonal variation in the Sun's sky path is demonstrated and the current evening sky is also shown. (45 minutes)

STORYBOOK SKY (Grades 2-12): The mythology and stories of a few prominent constellations. The tales of the ancient Greeks, native Americans, and many other cultures used the sky as a storyboard. A variety of these tales are told under the planetarium sky and the students also create their own constellations and stories. (45-60 minutes)

CONSTELLATIONS AND THE SKY TONIGHT (Grades 2-12): How to find and recognize constellations, using star charts, the planetarium sky, and practice in small groups. The emphasis is on learning a few constellations well so the student can find them in the real sky. Other features of the sky such as colors of stars are also shown. The short recorded show, *More Than Meets the Eye*, can be included as part of this program upon request. Maximum about 25 students. (45-60 minutes)

NAME THAT PLANET! (Grades 2-4): A unique tour of the whole solar system in a modified game-show format. Dozens of pictures show each planet and comparisons and contrasts among the planets. The current position of the planets in the sky and in their orbits is also shown. This program is designed to follow, not precede, the classroom unit. (60-70 minutes)

THE MOON AND MONTHS (Grades 3-6): A lesson on watching the moon, including its phases, when it is visible, how it moves across the sky, and its appearance to the eye and through binoculars. The connection between the moon and months and a short tour of the moon are also included. (45-60 minutes)

THE SUN AND SEASONS (Grades 3-6): A lesson on how the sun moves across our sky in different seasons and why there are seasons. The sun's sky path at other latitudes is also shown in order to illustrate the midnight sun and the opposite seasons of the southern hemisphere. The lesson begins with an explanation of why the Sun shines. (45-60 minutes)

WHAT TIME IS IT? (Grades 4-6): How our clocks and calendars are based on motions of the sky. Topics include the sun's motion across the daytime sky, the stars and their movement at night, the moon's phases and their connection to weeks and months, and the changing path of the Sun in different seasons. (45-60 minutes)

LIFE CYCLES OF STARS (Grades 5-12): An explanation of the life cycle of the Sun and other stars, including their birth, evolution, and death. Examples of most stages are identified in the night sky, including examples of what the Sun was like in the past and will be like in the future. In this way, the student's appreciation of the night sky is enhanced. (60 minutes)

ASTRONOMICAL COORDINATES (Grades 7-12): An explanation of the various coordinate systems and reference circles astronomers use to record and organize the motions of the stars and Sun in our sky. (45-60 minutes)

MARS WARS: PROVING THE EARTH MOVES (Grades 9-12): The question of how we can prove three things we take for granted: the Earth is round, it spins on its axis, it goes around the Sun. The program demonstrates and explains the astronomical proofs and shows that a round, moving Earth is a sophisticated concept that was not easy to prove. (45-60 minutes)

***** **WORKSHOP-STYLE PROGRAMS** *****

These programs are designed for small groups in a workshop/laboratory format. In each, the student keeps a quantitative record of the sky motions being demonstrated and learns the patterns by making predictions and comparing them with observations.

The maximum group size is 25 and most of these programs require 75 to 90 minutes to complete.

WATCHING THE SUN (Grades 7-12): Demonstrates the Sun's path across the sky in different seasons and as seen from different places on the earth. Before each step, the student predicts the Sun's motion, and thus over several steps learns the trends with season and latitude.

WATCHING THE MOON (Grades 7-12): Demonstrates the moon's path across the sky at different phases and seasons and when it rises and sets. Before each step, the student predicts the motion and thus over several steps learns the trends.

WATCHING THE PLANETS (Grades 8-12): Charting the movement of the planets against the backdrop of the constellations in order to understand why planets are seen in morning twilight, evening twilight, at night, or not at all.

KEPLER'S THIRD LAW (Grades 9-12): Demonstrates Kepler's law relating the period and radius of a planet's orbit. Available for either inner or outer planets.

***** FULL-DOME SHOWS *****

Full-dome shows surround you with video that fills the entire dome and can immerse you in distant landscapes or reveal the night sky in all its glory. Together with narration and surrounding sound the video can show you the cosmos in a way that no other medium can. These shows are preceded by a live introduction and followed by a question-and-answer period, so allow a total of about an hour.



Kid shows

ONE WORLD, ONE SKY (preschool through 1st grade): Using Sesame Street's Big Bird and Elmo, this delightful show takes our youngest visitors around the world and to the Moon. Along the way, they'll learn about the Sun, stars, constellations, and our neighbor the Moon. (27 minutes)

THE ALIEN WHO STOLE CHRISTMAS (Grades 1 and up): Can an alien really steal Christmas? Find out in this program written in rhyme that explores the winter sky and follows the hijacked Santa from planet to planet and back to Earth. (public show, 2021) (31 minutes)

OUR PLACE IN SPACE (Grades 2-3): Join Scarlett Macaw as she solves a crossword puzzle about the sky, along the way discovering the cause of day and night, secrets of the Sun, the beauty of the constellations, and exotic places in space. (32 minutes)

RUSTY ROCKET'S LAST BLAST (Grades 2-5): Rusty Rocket's last trip is a tour of the Solar System training the next generation of rocket rookies about the wonders of the planets. (34 minutes)

SECRET OF THE CARDBOARD ROCKET (Grades 1-6): An introduction to the solar system using the story of a cardboard rocket that takes two children on an adventure trip to the Sun and each planet. Includes spectacular video effects. (public show, 2015) (40 minutes)

TRIP THROUGH SPACE (Grades 5-8): A gentle instructive tour of the Universe from winter sky to planets to stars and galaxies, including eclipses & seasons. (28 minutes)

Light and Telescopes

TWO SMALL PIECES OF GLASS (Grades 3 and up): The invention of the telescope in the early 1600s, how astronomers have used telescopes from Galileo's day to ours, and a look ahead to giant telescopes of the future. (public show, 2014) (23 minutes)

COSMIC COLORS (Grades 3 and up): Light on Earth and from space comes in many colors. See how these many colors of light are created and what they tell us about stars and the cosmos. Learn why the sky is blue and why Mars is red. See x-rays from a black hole, see the green in a plant leaf, and go inside the human eye. (public show, 2021) (31 minutes)

CHASING THE GHOST PARTICLE (Grades 5 and up): Astronomy from the South Pole! See stunning views of the white icescape at the end of the world! Visit the IceCube observatory that is searching for the elusive neutrinos, particles from the dawn of time that hold secrets of the cosmos. (public show, 2020) (25 minutes)

PHANTOM OF THE UNIVERSE: THE HUNT FOR DARK MATTER (Grades 9 and up): Mysterious dark matter that vastly outweighs the visible matter we can see. See the search for this invisible matter that dominates our universe. (27 minutes)

IBEX (Grades 5 and up): With teenage guides, learn about the IBEX satellite that is studying the boundary between the Sun's magnetic field and the interstellar magnetic field. (29 minutes)

Watching the Sky

THE SKY WE DON'T SEE (Grades 4 and up): The spectacular sky seen from the Southern Hemisphere. Begins with the stars and constellations we see from here, then heads south. See southern stars and constellations, including the Southern Cross and Alpha Centauri, the nearest star past the Sun, and many more. See spectacular sights snared by southern hemisphere telescopes. Hear sky mythology of southern cultures. (25 minutes)

ANIMALS OF THE SKY (Grades 3 and up): Many of the sky's constellations are animals, such as the great bear Ursa Major, Leo the Lion, Pegasus the winged horse, Scorpius the Scorpion, and more. Hear their stories in this delightful show. (24 minutes)

MY HOUSE HAS STARS (Grades 2 and up): Constellations as seen from many countries around the world—Nepal, Japan, Brazil, and more. Hear children describe their houses—pueblos, round huts, stone lodges; the stars and constellations they see; and their sky stories (public show, 2021) (30 minutes)

CONSTELLATIONS (Grades 3 and up): Connect to the stars and constellations. The classical constellations that fill our sky — their mythology, the zodiac, their stars, and astronomical wonders. Greek, Mayan, Egyptian, and Chinese constellations. The Big Dipper and bears and caribou. The new patterns humans can imagine today. (25 minutes)

IT'S ABOUT TIME (Grades 3 and up): We live our lives by cosmic cycles: days and nights, the Sun moving across the sky, the moon and months, days of the week. Meet them all, plus geological time cycles and Einstein's cycles of time. (26 minutes)

Biology and life in the Universe

STARS TO STARFISH (Grades 5 and up): The oceans are alive with life and color, revealed here with gorgeous underwater photography and videography. (20 minutes)

NATURAL SELECTION (Grades 7 and up): Join Charles Darwin on his voyage to the Galapagos where he developed the theory of evolution by natural selection. Hear Darwin explain it all and see the sights and species that led him to his discovery. Suitable for biology classes in high school and college. (public show, 2022) (39 minutes)

SPACE ALIENS (Grades 5 and up): Is there intelligent life elsewhere in the Universe? A debate examines the pros and cons to the ultimate question: Are we alone? (public show, 2022) (28 minutes)

DINO SOARS! CHANGE OVER TIME (Grades 3 and up): Dinosaurs were raptors: they flew! They developed archeopteryx, the predecessor to birds. They developed giant forms such as T Rex. Then an asteroid struck the Earth and the dinos were destroyed. Follow the story of Malkia, a museum paleontologist, as she explores the fascinating connections between birds and dinosaurs. (24 minutes)

Astronauts in Space

DAWN OF THE SPACE AGE (Grades 4 and up): The human exploration of space from the Moon landings of the 1960s to today's International Space Station. See the Moon landings as never before and peek at possible future missions to Mars. Includes awesome video effects. (public show, 2016, 2019) (40 minutes)

WE CHOOSE SPACE (Grades 4 and up): Guided by the astronauts themselves, visit and tour the International Space Station, see its construction, re-live the Apollo missions to the Moon, and visit future Moon colonies. (public show, 2019) (22 minutes)

BACK TO THE MOON FOR GOOD (Grades 4 and up): Learn the life story of our nearest neighbor in space and the challenge to private groups to land a rocket on the Moon, travel 500 meters, and return images and video. (public show, 2016) (25 minutes)

APOLLO 11: MAN'S FIRST STEP ONTO THE MOON (Grades 3 and up): The incredible story of Apollo 11, the first mission to land astronauts on the Moon. From launch, to landing, to the first walk on the Moon, to liftoff, to legacy (26 minutes)

The Earth

FIREFALL (Grades 5 and up): Throughout its history, the Earth has been hit by meteorites, comets, and asteroids. These impacts have shaped the planet we live on today and have changed the course of life on Earth. See these fiery impacts that still take place today. (public show, 2019) (34 minutes)

DID AN ASTEROID REALLY KILL THE DINOSAURS? (Grades 5 and up): What took out the dinosaurs 65 million years ago? Was it an asteroid impact? See the evidence that the dinos fell victim to an impact from space. (public show, 2019) (24 minutes)

A TEENAGER'S GUIDE TO THE GALAXY (Grades 5 and up): Inventive Milwaukee teens created this show that will take you on a dynamic journey through space and time. Discover the origins and fate of the Earth, Sun, Moon, and Universe; visit black holes; see how cosmic collisions and water have shaped our Earth. (30 minutes)

DEFYING GRAVITY: IT IS ROCKET SCIENCE (Grades 4 and up): From footballs and amusement parks, to rockets and space flight, to a low-gravity moon base, how humans have tried to overcome gravity. Then come Einstein's theory of gravity and black holes, where gravity wins! (23 minutes)

The Solar System

OASIS IN SPACE (Grades 4 and up): Earth's water makes it an oasis for life. See how our water came from space. Tour other planets where the water has boiled away or has frozen into ice. (public show, 2015) (30 minutes)

EDGE OF DARKNESS (Grades 4 and up): The New Horizons mission returned spectacular pictures of faraway Pluto in 2015 and at the same time the Dawn mission sent home spectacular images of the asteroids Ceres and Vesta. See the best of these dark and distant worlds. (public show, 2017) (25 minutes)

UNDISCOVERED WORLDS (Grades 5 and up): We have now discovered hundreds of planets around other stars and are on the verge of finding other Earths. See how astronomers search for planets and some of their most exciting finds. (public show, 2017) (32 minutes)

THE SOLAR SYSTEM SHOW: PLANET FUN FOR EVERYONE (Grades 3 and up): Narrated by kids, a tour of the solar system from the Sun to the farthest planets, with moons, asteroids, and comets along the way, and a look at planets around other stars. (23 minutes)

Stars and the Universe

FROM EARTH TO THE UNIVERSE (Grades 5 and up): A spectacular tour of the Universe from Earth and planets to stars and faraway galaxies to the edge of the Universe. (public show, 2019) (32 minutes)

EXPLODING UNIVERSE (Grades 5 and up): Explosions fill the Universe, from the Big Bang that began it all, to exploding stars, to black holes, to colliding galaxies, to the great collision/explosion that created the Moon, to supervolcanoes on Earth. Witness them all shaping and re-shaping the Universe during this show. (33 minutes)

WE ARE STARS (Grades 5 and up): The atoms that make us up were made in distant stars. Follow a group of time travelers back to Big Bang when the first atoms were made. Watch as these atoms gather into stars and galaxies. See how stars made all the atoms needed for life and how these atoms found their way to Earth and into us. (public show, 2020) (35 minutes)

BLACK HOLES (Grades 5 and up): Mysterious black holes are among the most mystifying places in the Universe. Their gravity is so strong that nothing can escape, not even light. Learn all about the weird behavior of matter, space, and time in and around black holes and see how astronomers can detect them. (public show, 2019) (37 minutes)

HOT ENERGETIC UNIVERSE (Grades 9 and up): A tour of our observatories and the Universe they unveil, with emphasis on the exciting discoveries revealed by studying x-ray and gamma-ray light. Suitable for high school physics classes. (30 minutes)

COSMIC RECIPE: SETTING THE PERIODIC TABLE (Grades 5 and up): “To make apple pie, you must first make the Universe.” How the Universe made all its elements, those in the chemists’ periodic table and in apple pie: from the Big Bang, to the hot hearts of stars, to the colossal explosions of supernovae. (public show, 2021) (24 minutes)

THE SUN: OUR LIVING STAR (Grades 3 and up): Our life on Earth depends on energy from the Sun. We have built monuments such as Stonehenge that point to key directions of sunrise. We discovered that the Earth revolves in an orbit around the Sun; we are discovering planets around other stars. We now know how the Sun creates energy and how the Sun affects the Earth and how to harvest solar power from the Sun and how to harvest past solar power in fossil fuels. (public show, 2022) (24 minutes)

SUNSTRUCK (Grades 3 and up): The Sun is the source of our life-giving energy. You’ll discover the layers of the Sun and energy production in the Sun. You’ll meet sunspots and solar storms, the solar wind, and threats to the Earth’s atmosphere. You’ll discover the future of the Sun and the effect the dying Sun will have on the Earth. (public show 2022) (21 minutes)

DARK MATTER MYSTERY (Grades 5 and up): Beginning with the discovery of Neptune from irregularities in the motion of Uranus, this show traces the evidence of vast amounts of dark, unseen matter that is the dominant form of matter in galaxies and the universe. What is this dark matter made of? Many efforts to unlock what dark matter is are described. (38 minutes)

OUT THERE: THE QUEST FOR EXTRATERRESTRIAL WORLDS (Grades 5 and up): The quest for finding life on other planets and moons of the solar system. Methods of searching for planets around other stars and some of the numerous results. Are some of these planets habitable? (30 minutes)

A TO Z ASTRONOMY (Grades 3 and up): A sampler of all things astronomical—A is for asteroid, B is for black holes, stars, icy moons, dark matter, extraterrestrials, great telescopes, Z is for zodiac, and much more. (25 minutes)

MAKING OF A STAR (Grades 3 and up): The ancient Greek Earth-centered model of the Solar System, the discovery of the Sun-centered model, and the modern chaotic model of star formation. (30 minutes)

Culture

THE FIRST STARGAZERS (Grades 5 and up): Discover how the first stargazers around the world experienced the sky above. Watch a first stargazer create a Moon calendar 30,000 years ago. Discover how the ancients tried to understand the sky and how modern astronomy grew from their work. (public show, 2020) (24 minutes)

CLEOPATRA'S UNIVERSE (Grades 6 and up): The life and times of the brilliant exotic Queen Cleopatra. Visit her palace and the wonders of her world. See the work of brilliant astronomers in her Egypt. (25 minutes).

STARS OF THE PHARAOHS (Grades 6 and up): Ancient Egyptians knew the starry sky and its patterns and cycles. Learn how they brought this rich sky to Earth in their Pyramids, temples, and tombs that we can see today. (public show, 2018) (36 minutes)

TALES OF MAYA SKIES (Grades 6 and up): Discover how the mysterious Maya understood the patterns in the skies above—the Sun, the planets, the constellations—and how they tied their calendar and their earthly cities to that sky. (public show 2018) (34 minutes)

LIFE UNDER THE ARCTIC SKY (Grades 5 and up): The Sami people of northern Scandinavia live by herding reindeer in the endless days of summer and under the aurora (northern lights) during the near-endless nights of winter. See it all in spectacular images! (public show, 2021) (41 minutes)

LIGHT YEARS FROM ANDROMEDA (Grades 8 and up): Follow a light beam as it travels for over two million years from the Andromeda Galaxy to Earth. Watch the history of Earth as the light makes its journey. (30 minutes)

SKY WARS: BATTLES OF DISCOVERY (Grades 5 and up): From ancient Greece to the present day to space cities of the future, how astronomers have scoped the sky, disproved astrology and a flat earth, discovered that the Earth moves around the Sun, figured out the structure of the cosmos and our place in it, and wondered if there is life elsewhere. (26 minutes)

SPOOKY SPACE: COSMIC CONNECTIONS TO HALLOWEEN (Grades 2 and up): Ghosts, faces, witches, vampires—we can imagine seeing them in astronomical pictures from space and then we can imagine connecting them with Halloween. See it all in this show with a healthy dose of real science tossed in. Get stretched by spaghettification as you are sucked into a black hole. (public show, 2021) (23 minutes)

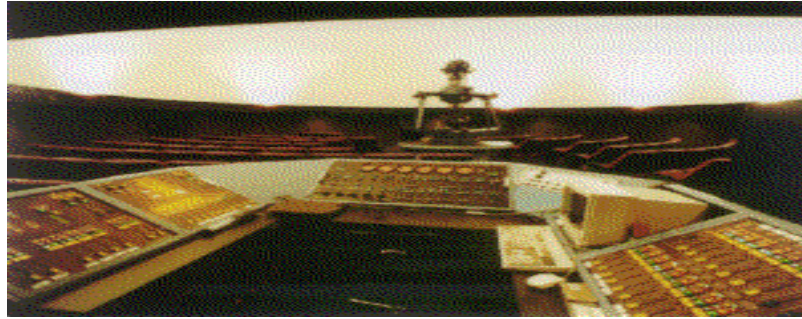
SISTINE CHAPEL (Grades 5 and up): A spectacular tour of the Vatican's Sistine Chapel and Michelangelo's fabulous artwork from the Creation through many episodes of the Bible and on to the Last Judgement. (public show, 2021, 2022) (24 minutes)

SOCRATES (Grades 5 and up): The life and philosophy, the trial, and the death of the ancient Greek philosopher Socrates. (33 minutes)

JULIUS CAESAR (Grades 5 and up): The life and death of Julius Caesar. The comet that appeared in Earth's life after Caesar's assassination. (33 minutes)

STARGAZERS OF AFRICA (Grades 3 and up): From the dawn of time, African people have looked to the skies above for inspiration and guidance. Meet skywatchers of ancient Egypt, hear creation stories from west Africa, visit Bushmen and the Milky Way, hear legends of eclipses, travel with humans migrating from Africa, and more. (25 minutes)

***** **CLASSIC MULTIMEDIA PROGRAMS** *****



These taped programs combine narration, music, dozens or hundreds of images and other visuals, and the planetarium starfield in an instructive multimedia show. They are preceded by a live introduction and followed by a question-and-answer period.

The roster of available programs includes all of our former public shows plus several others we maintain specifically for school classes. It has been our experience that most programs designed with adults in mind also work well for children as young as grades 3 or 4. A few programs designed just for children have an upper grade limit indicated.

The maximum group size is 114, our seating capacity.

Most taped shows are about 40 minutes long, so plan a total of 60-75 minutes to allow enough time for questions.

After each program description, we have listed the running time and number of images. Programs created at BGSU are also marked BG.

For the Youngest Students

DON'T DUCK, LOOK UP! (preschool through 1st grade): Meet Dudley, a bright little duck who hatches before your eyes and begins to learn about the sky with his barnyard of animal friends. (15 minutes, 89 images)

WILBEAR'S ADVENTURE (Grades K and 1) Wilbear (named for Wilbur Wright) is a teddy bear who wants to fly. (22 minutes, 169 images plus video)

ZUBENELGENUBI'S MAGIC SKY (K-1) An interactive program that helps the youngest students explore the daytime and nighttime sky. (22 minutes, 150 images plus video)

LARRY, CAT IN SPACE (Grades K-2): The playful story of an inquisitive cat who takes a trip to the moon, told through a "cats-eye-view" of the moon, space travel, and living on another world. (30 minutes, 160 images)

GEORGE AND OATMEAL SAVE SANTA (Grades K to 4) George the wizard and Oatmeal the snowman show a lost Santa how to use stars to find his way home. (20 minutes, 98 images)

For Young Students

THE LITTLE STAR THAT COULD (Grades 1-2): An introduction to stars and planets using the story of a little yellow star (the Sun) that wanders through space to meet many kinds of stars and finally discovers its own planets. (34 minutes, 147 images)

THE DAY THE EARTH TURNED THE WRONG WAY (Grades 1 and up): A story-format program on the environment in which the Earth protests environmental abuses by rotating backwards. The program shows many of these abuses and their effects and appeals to children to respect the earth. (18 minutes, 212 images, BG)

HERCULES AND OTHER SUPERHERO STARS (Grades 1 to 4) Watch Hercules and other heroes come alive to show how stars work, the difference between red and blue stars, and other stellar wonders in the sky above. (33 minutes, 206 images plus video)

WINTER WONDERS (Grades 1 and up) Join two curious kids as they explore the mystery of the Star of Bethlehem and the Winter Solstice. Hear cultural stories about the Sun's victory over winter from China, Africa, Polynesia, and other stops around the globe. (43 minutes, 188 images)

BEAR TALES (AND OTHER GRIZZLY STORIES) (Grades 2 and up). An introduction to constellations using a grandfatherly character who teaches his grandchildren the star patterns and stories about them. (33 minutes, 72 images)

Biology and Extraterrestrial Life

LIFE BEYOND EARTH (Grades 5 and up): Explores the possibility of extraterrestrial life, the search for life-bearing planets, and the history of life on earth. (32 minutes, 375 images)

THE STELLAR THREAD (Grades 10 and up): A look at DNA, explaining its role in our lives and the origin of its atoms in the stars. Suitable for biology, chemistry, or general science classes. (46 minutes, 155 images)

THE SEABIRD SHOW (Grades 2 and up): A celebration of seabirds and their environment, including the colorful puffins which range from Alaska to Europe. Can be combined with The Day the Earth Turned the Wrong Way as a double-feature for the price of one show. (public show, 1993) (28 minutes, 363 images plus video, BG)

IN SEARCH OF PLANETS WITH LIFE (Grades 5 and up): Describes the recent discoveries of planets around other stars and considers whether these newfound planets or any of the other planets in our solar system may be suitable for life. (public show, 1998) (32 minutes, 352 images plus video)

The Solar System-general

NINE PLANETS AND COUNTING... (Grades 3 and up): A 21st-century tour of the Solar System, covering all the planets as well as asteroids and comets, with a special emphasis on the question of whether Pluto is or is not a planet. (public show, 2007) (42 minutes, 391 images plus video)

PLANET PATROL (Grades 3-5): An imaginative and instructive tour of the whole solar system with Investigator Sam Snork who travels around searching for a mysterious radio transmission. Includes images and video of each planet. (public show, 2000) (40 minutes, 325 images plus video)

321 BLASTOFF (Grades 1 to 4) Go with two young kids as they go on the adventure of a lifetime exploring the Sun and planets. (35 minutes, 223 images)

UNWORLDLY WEATHER (Grades 3 and up): The most spectacular weather on the Earth, other planets and moons, and the Sun, including hurricanes, tornados, thunderstorms, floods, drought, and extreme hot and cold, as well as many types of clouds, rain and snow. (public show, 1994) (44 minutes, 517 images plus video, BG)

PLANET QUEST (Grades 5 and up): The appearance of the planets in our sky, how the ancient Greeks thought all planets revolved around the earth, and an imaginary journey to each planet using space art and photography. (public show, 1986) (43 minutes, 358 images, BG)

OCEANS IN SPACE (Grades 4 and up): The oceans of Earth and other planets. Explores the Earth's oceans and their connection with life. Recreates possible ancient oceans on Mars and the probable present ocean on Jupiter's moon Europa, and visualizes possible oceans on planets around other stars. (public show, 2007) (30 minutes, 186 images plus video)

The Moon

FOOTSTEPS (Grades 4 and up): A program about the moon, including the moon's origin and history, early myths and stories about the moon, the Apollo manned missions to the moon, and future uses of the moon. (41 minutes, 172 images plus video)

LUNAR ODYSSEY (Grades 3 and up): An imaginary 21st century trip to the Moon that recounts the Moon's origin, tours its craters and other surface features, shows what it would be like to live on the Moon, explains the Moon's phases, and gives tips for watching the Moon in the sky. (public show, 2001) (42 minutes, 377 images plus video)

ONCE IN A BLUE MOON (Grades 2 and up): A wide-ranging program about the Moon, covering the Moon's origin and surface features, the first Moon landing by astronauts, myths about the Moon from around the world, and an explanation of the Moon's phases. (public show, 2006) (37 minutes, 295 images plus video)

The Solar System-individual planets

MAGELLAN: REPORT FROM VENUS (Grades 4 and up): The planet Venus as revealed by the Magellan and other spacecraft, including the spectacular surface and thick atmosphere. (29 minutes, 160 images)

TRANSIT OF VENUS (Grades 4 and up): All about the rare "transits" when Venus passes directly between the Earth and the Sun. Explains the astronomy involved and the fascinating stories of past transits. The June 2004 transit is the first since 1882. (public show, 2004) (35 minutes, 228 images plus video)

THE MARS SHOW (Grades 3 and up): A look at Mars past, present, and future: as described in science fiction, as revealed by spacecraft missions, as colonized within a century. (public show, 1988) (41 minutes, 375 images)

MARSQUEST (Grades 4 and up): Successor to the Mars Show. A new look at Mars past, present, and future: as described in science fiction, as revealed by spacecraft missions, as colonized within a century. (public show, 2002) (41 minutes, 357 images)

THE VOYAGER ENCOUNTERS (Grades 4 and up): A tour of the outer planets (Jupiter, Saturn, Uranus, and Neptune), their moons, and their rings through the eyes of the Voyager spacecraft, and a look at how the spacecraft worked. (public show, 1990) (43 minutes, 420 images)

RINGWORLD (Grades 4 and up): Saturn, its many moons, its magnificent rings, and the Cassini-Huygens spacecraft mission due to arrive at the ringed planet in 2004, go into orbit, and send a lander to the mysterious moon Titan. (public show, 2004) (35 minutes, 323 images plus video)

HALLEY: A COMET'S TALE (Grades 2 and up): The saga of Halley's Comet, its birth, its trips around the Sun, its future, and its record in history. (public show, 1985) (37 minutes, 289 images, BG)

COMETS ARE COMING! (Grades 4 and up): All about comets, including what they're like, how astronomers discover and study them, comet collisions with planets, Halley's Comet, and more. Can be combined with Cosmic Explorer for the price of one show. (public show, 1997) (34 minutes, 275 images plus video)

The Earth

WATER WORLD (Grades 4 and up): The marvelous story of planet Earth: its birth and life history; its drifting continents, mountains ranges, and volcanoes; its oceans, ice ages, and life; and its ultimate fate. (public show, 1992) (44 minutes, 566 images, BG)

NEW WORLDS? (Grades 4 and up): To commemorate the 500th anniversary of Columbus' landfall, a story of human exploration of the Earth, including the first Americans, the ancient Greeks and Phoenicians, the Vikings, Columbus, and today's astronauts. Suitable for use with history and geography as well as astronomy classes. (public show, 1992) (49 minutes, 655 images, BG)

DINOSAUR LIGHT (Grades 5 and up): A unique trip out in space and back in time. The light we now see from stars and galaxies left them long ago, when the events we record on human history and the Earth's history were happening. The program weaves together a tour of the present-day Universe with a history of the Earth from recent events to the days of the dinosaurs. (public show, 1996) (51 minutes, 571 images plus video, BG)

AURORA! (Grades 5 and up): Examines the science and folklore of the fascinating northern lights and includes superb video of their color and changing appearance. (public show, 2001) (35 minutes, 302 images plus video)

THEY FOUND A WORLD OF ICE AND BEAUTY: POLAR EXPLORATION AT THE ENDS OF THE EARTH (Grades 5 and up): A showcase of the natural beauty and brave exploration of the Arctic and Antarctic as recorded by the eyes of modern cameras and as revealed in the adventures of early explorers. (public show, 1996) (44 minutes, 454 images plus video, BG)

COSMIC CATASTROPHES (Grades 4 and up): A look at astronomical events that may threaten life on Earth, ranging from the explosions of massive stars to the impact of giant meteorites. Also includes human threats such as damage to the ozone layer and the danger of nuclear winter. (public show, 1993) (38 minutes, 377 images plus video)

THE ENDLESS HORIZON (Grades 5 and up): The human exploration of Earth and space. Includes stone-age skywatchers, Columbus' voyage, the work of Darwin and Newton, the development of flight, and landing on the Moon. (public show, 1994) (46 minutes, 237 images plus video)

BLOWN AWAY: THE WILD WORLD OF WEATHER (Grades 3 and up): The wild and wonderful weather of planet Earth. Covers hurricanes, tornados, thunderstorms, the cause of seasons, and the effect of seasons on weather. (public show, 2008) (38 minutes, 289 images plus video)

Stars and the Universe

TO SHINE ALMOST FOREVER: THE INCREDIBLE LIVES OF STARS (Grades 4 and up): The life cycles of stars, from their birth out of interstellar gas and dust, to their lifetimes of billions of years, to their expansion to become giant stars, to their final explosions and fading out. Emphasizes how stars work, the production of chemical elements in stars, and how to see the various stages of starlife in the night sky. (public show, 1995) (43 minutes, 465 images plus video, BG)

JOURNEY TO EARTH (Grades 5 and up): A unique journey from the Milky Way to the universe at large and back to the earth to discover the place of the earth and humans in the universe. The hierarchy of structure (planets, stars, galaxies, clusters of galaxies) and vast distance scales of the universe are built up, and the creation in other stars of the elements comprising humans is revealed. One of our best programs. (public show, 1988) (38 minutes, 345 images, BG)

SPRINGTIME OF THE UNIVERSE (Grades 6 and up): The life story of the Universe and its stars, including life cycles of stars, the future of the Sun and earth, and a glimpse at the far future of the Universe. (public show, 1985) (46 minutes, 125 images plus video)

COSMIC EXPLORER (Grades 5 and up): A tour of the Universe through the eyes of artists, from the nearest planets to the farthest galaxies, and all the wonders in between. With images and music alone, the beauty of the Universe is revealed. Can be combined with *Comets are Coming!* for the price of one show. (public show, 1997) (13 minutes, 175 images)

DINOSAUR LIGHT (Grades 5 and up): A unique trip out in space and back in time. The light we now see from stars and galaxies left them long ago, when the events we record on human history and the Earth's history were happening. The program weaves together a tour of the present-day Universe with a history of the Earth from recent events to the days of the dinosaurs. (public show, 1996) (51 minutes, 571 images plus video, BG)

STAR STEALERS (Grades 4 and up): A cosmic "whodunit?" in which detective Sam Snork investigates the mystery of the missing stars. Along the way he learns all about the lives of the stars. (public show, 1997) (46 minutes, 339 images plus video)

ALPHABET UNIVERSE (Grades 5 and up): An astronomical sampler with a bit of everything. Twenty-six topics from A to Z cover the Universe from skywatching to planets, stars, and galaxies. (public show, 1998) (48 minutes, 541 images plus video, BG)

SPACE DREAMS (Grades 3 and up): Ancient and modern dreams inspired by looking to the sky—the dreams and birth of space travel, the quest of astronomers to understand the cosmos, and the hopes of finding alien life. (public show, 2004) (35 minutes, 285 images plus video)

A BRIEFER HISTORY OF TIME (Grades 5 and up): A time-lapse history of the Universe from the Big Bang beginning through the appearance of stars, planets, and people. (36 minutes, 145 images plus video)

STELLAR EXTREMES (Grades 9 and up): Nature's most extreme stars: bigger, brighter, and hotter than the Sun or stars that have gone small at the ends of their lives. (45 minutes, 308 images plus video)

Watching the Sky

THE COWBOY ASTRONOMER (Grades 4 and up): The joys of watching the sky—stars, constellations, secrets of the Universe, and sky stories—all from a cowboy's point of view. (public show, 2008) (37 minutes, 113 images)

THE STARGAZER (Grades 7 and up) A curious child becomes an astronomer and learns how astronomers use light and gravity to decipher the lives of the stars. Based on a true-life story. (37 minutes, 159 images plus video)

AMAZING STARGAZING (Grades 3 and up): A light-hearted and comprehensive guide to skywatching, covering constellations, the Sun, the Moon, the planets, and other sights of the night sky. (public show, 2002) (35 minutes, 196 images plus video) For older classes, the following program can also be included as part of this presentation: **SAVING THE NIGHT** (Grades 5 and up): A short show about the dangers of light pollution and what we can do to recover a dark and inspiring night sky. (public show, 2002) (11 minutes, 68 images)

MORE THAN MEETS THE EYE (Grades 4 and up): An introduction to stargazing, showing what can be seen with the eye, binoculars, and telescopes. Available upon request as part of the live program *Constellations and The Sky Tonight*. (see page 3) (17 minutes, 31 images)

THE LIGHT-HEARTED ASTRONOMER (Grades 5 and up): An introduction to skywatching, both with the unaided eye and with telescopes. Upon request, a showing of the program *More Than Meets the Eye* can be included as part of this show. (public show, 1993) (31 minutes, 261 images)

STAR TRACKS (Grades 3 and up): A guided tour of the winter sky and a just-for-fun "space journey" combining space music and motions of the starfield. (public show, 1985) (48 minutes, 28 images, BG)

Light and Telescopes

GALILEO: THE POWER OF THE TELESCOPE (Grades 5 and up): Tells the story of Galileo, his pioneering discoveries with the telescope, and how the telescope has developed in the four hundred years since Galileo. (public show, 2010) (27 minutes, 223 images plus video)

HUBBLE VISION (Grades 4 and up): The latest and best discoveries of the Hubble Space Telescope, featuring dozens of Hubble's best images and what we have learned from them. (public show, 2005) (30 minutes, 238 images)

HUBBLE'S UNIVERSE (Grades 5 and up): The exciting discoveries of the Space Telescope from nearby planetary landscapes to the farthest sights we can see. Includes a description of how the telescope works. (public show, 2001) (39 minutes, 273 images plus video)

THROUGH THE EYES OF HUBBLE (Grades 5 and up): A tour of the Universe through the eyes of the Space Telescope: comet collisions with Jupiter, sites of starbirth, stellar explosions and black holes, remote galaxies, and more. Includes a description of the Telescope. (public show, 1995) (42 minutes, 250 images plus video)

FIRST LIGHT (Grades 4 and up): The story of the Space Telescope and a guide to the universe it will reveal, along with the history of telescopes. (public show, 1987) (33 minutes, 346 images)

ADVENTURES ALONG THE SPECTRUM (Grades 5-8): Light and how astronomers use it to study the universe. Professor Photon leads from the familiar realm of visible light to the invisible realm of ultraviolet, infrared, microwave, and radio energy. (42 minutes, 147 images)

HOTTER THAN BLUE (Grades 9 and up) How astronomers use the most energetic types of light to explore the Universe in colors the human eye cannot see. (41 minutes, 93 images plus video)

Astronomy in Everyday Life

WORLDS IN YOUR WALLET (Grades 5 and up): How the world's money tells the story of science. Using dozens of images of scientists on the world's money as textbook and tour guide, this interdisciplinary show covers topics in biology, math, astronomy, and physics, including electricity and magnetism, radioactivity, atoms and nuclei, gravity, and more, using an approach that combines science, history, and biography. Suitable for use with history or geography as well as astronomy or general science units. (public show, 2006) (50 minutes, 475 images, BG)

STAR-SPANGLED BANNERS (Grades 5 and up): A world-wide tour of astronomical flags and the nations, states, and cities that fly them. Dozens of flags around the world float images of the Sun, the Moon, stars and constellations, and the northern lights. This interdisciplinary program shows all of these flags, explains the celestial sights they embody, and visits the places that fly them. Suitable for use with history or geography as well as astronomy or general science units. (public show, 2003) (46 minutes, 544 images, BG)

IT'S ABOUT TIME (Grades 5 and up): The tale of astronomy's greatest effect on our everyday lives: keeping time. Our clocks and calendars record all the cycles of the sky, such as the rising and setting of the sun and stars, the phases of the moon, the passage of the seasons, and more. The program shows all of these celestial cycles and tells the story of how many early cultures based their calendars on them, thereby creating hours, days, weeks, months, years, and all the other ways we keep time today. Suitable for use with history or geography as well as astronomy or general science units. (public show, 1987) (47 minutes, 488 images, BG)

IS THIS THE END OF THE WORLD? (Grades 5 and up): A wide-ranging astronomer's look at end of the world topics. Tells the saga of the race to be first to the South Pole, commemorates the Apollo moon landings a half-century later, and explains how the moon was made. Recounts "end-of-the-world" scares caused by comets, meteor showers, and calendar changes. Looks at meteorite and asteroid impact in the recent and distant past, and forecasts the Earth's future. (public show, 1999) (48 minutes, 608 images plus video, BG)

I PAINT THE SKY (Grades 3 and up): A guide to the beautiful colors in the sky: blue daytimes, red sunsets, vibrant rainbows, shimmering auroras, icy halos, and more. (public show, 1989) (34 minutes, 476 images, BG)

CENTURIES! (Grades 4 and up): A bicentennial show that tells Ohio's history from the ancient ice ages to the modern space age. Covers Ohio's geological past, the legacy of native Americans, European settlement, Ohio's statehood, the Civil War, the Wright Brothers, and Ohio's famous astronauts. Suitable for history classes. (public show, 2003) (47 minutes, 396 images)

BAD ASTRONOMY: MYTHS & MISCONCEPTIONS (Grades 6 and up): Debunks several popular myths and misconceptions about astronomy—the Moon Hoax, UFOs and alien visitors, and astrology—all with good humor. (public show, 2009) (38 minutes, 182 images plus video)

Cultures and Astronomy

SKY STONES (Grades 4 and up): An interpretive trip to Stonehenge, the pyramids of Egypt, the temples of the Maya, and several native American sites, all part of the legacy of ancient skywatchers who recorded the movement of the sun, moon, planets, and stars in their great stone monuments. (public show, 1991) (45 minutes, 462 images, BG)

SKYWATCHERS OF AFRICA (Grades 3 and up): The legacy of African skywatchers. Includes the Pyramids and skylore of Egypt, desert traders using the stars as a roadmap across the sand, creation myths of the Dogon, prehistoric records of the Moon's phases, and more. (public show, 2005) (29 minutes, 380 images)

SPIRITS FROM THE SKY (Grades 3 and up): The star world of the Pawnee Native American Nation. How Pawnee priests watched the appearance of planets, stars, and constellations, and used them to pattern their lives and culture. Told with authentic music and the voice of a Pawnee elder. (public show, 2005) (35 minutes, 350 images)

LAND OF THE SOUTHERN CROSS (Grades 2 and up): A trip to Australia, covering the cities, land, people, animals, coasts, observatories, and the southern hemisphere skies. (public show, 1989) (45 minutes, 656 images)

SERPENTS OF THE SUN (Grades 3 and up): Ohio's prehistoric mounds and their astronomical significance. Visits Serpent Mound, Fort Ancient, and other earthen mounds which are aligned with the Sun. (public show, 1994) (41 minutes, 257 images)

ISLANDS IN THE SKY (Grades 4 and up): How the ancient Polynesians sailed vast distances of the Pacific Ocean in canoes navigating by the stars. (42 minutes, 149 images)

THE PEOPLE (Grades 3 and up): A collection of American Indian myths about the sky told using the sun, starfield, and artwork. (48 minutes, 116 images)

NAVIGATING WITH LEWIS & CLARK (Grades 5 and up): A trip with Lewis and Clark along the route they followed in exploring the American west over 200 years ago, with emphasis on how they used the sky to navigate and record their route. (public show, 2007) (35 minutes, 299 images)

THE WRIGHT WAY TO FLY (Grades 4 and up): How the Wright Brothers developed and flew their first airplane. In an interview style, covers the principles of flight and the story behind the first flight in 1903. Suitable for history classes. (public show, 2004) (37 minutes, 150 images plus video)

HUMANITIES AND THE STARS (Grades 6 and up): A series of 11 lecture-like programs relating the mythology of ancient cultures and the night sky those cultures saw. Programs are available on the following cultures: Polynesian-Hawaiian, Mayan, American Plateau, Eskimo, Norse, British Celtic, Chinese, Hindu, Egyptian, Babylonian, and Greek. Each program describes its culture and recounts several myths. Since these programs are shorter and less elaborate than our others, you may select any two as a single show. (approximately 30 minutes, 90 images each)

SECRET OF THE STAR (Grades 3 and up): A program for Christmas. It shows the origin of many Christmas customs in ancient solstice festivals, retells the first Christmas story, and demonstrates several theories of the star of Bethlehem. (public show each year since 1989) (42 minutes, 594 images, BG)

Scientific Theories

THE UNIVERSE OF DR. EINSTEIN (Grades 5 and up): A biography of Albert Einstein and a conversational approach to explain his revolutionary concepts of the Universe. (public show, 1986) (41 minutes, 258 images)

RELICS OF THE BIG BANG (Grades 9 and up): The search for mysterious particles left over from the Big Bang and how they reveal the nature of the Universe. (34 minutes, 101 images plus video)

Space Exploration

DESTINATION UNIVERSE (Grades 3 and up): The future of space exploration and colonization from Space Station Freedom to planetary engineering projects thousands of years in the future. (public show, 1991) (37 minutes, 365 images)

ALL SYSTEMS GO! (Grades 3 and up): The story of NASA from its inception to the development of the Space Shuttle, with emphasis on the Apollo manned missions to the moon. (public show, 1984) (43 minutes, 313 images plus video)

