<u>U-46 Planetarium Program Outline – Lesson Sequence K-12, 2023-2024</u>

Each lesson includes a look at the nighttime sky and astronomy content through a multi-media presentation and often a look at the history of the building/time telling. The content is aligned with the Illinois State Science Standards (NGSS) in each grade and the U-46 curriculum.

Grade	LESSON PRESENTED
Kdg	*One World, One Sky What is a planetarium? Watch sky from sunrise to sunrise-basic constellations introduce cardinal directions and east to west movement pattern, Explore: Sun in daytime is warm and bright; no sun at night means cooler & dark; the higher/longer Sun is, the warmer Earth gets K-PS3-1, some KPS3-2 & KESS2-1
1	* <i>The Moon</i> : focus on observing, describing and predicting observable changes in sky (Moon phase patterns); rises in east, sets in west, notice the Sun is higher and up longer in the summer and lower in the winter, observe night constellations 1-ESS1-1, some ESS1-2, 1PS4-2
2	Rocky Earth in Space: Sort planets and rocks by observable properties, rocks change slowly and can change fast, Earth and Moon have surface evidence of big rocks hitting it (craters), 2-PS1-1, 2-ESS1-1
3	What are the northern lights (magnetic field of Earth), Planets are in motion around the Sun (rotate & revolve) and each go different speeds, speed equals gravity inward from Sun (balanced forces) 3PS2-3, 3PS2-2, PS2-1
4	History of the ENWC Observatory telling & transmitting time, importance to community/economy, observe satellite imagery for craters from impacts, using Earth (rocks) to measure time of events, erosion, K-T boundary 4ESS2-1, 4ESS2-2, 4PS3-1 &PS3-3 plus SS.EC.2.4, SS.G.2.4
5	Differences in brightness of nighttime stars to each other AND the Sun, What about the North Star? What yearly, monthly and daily patterns we see in the sky? How to chart or graph that? Can we make predictions based on what we see? Which way is down in space? 5ESS1-1, 5ESS1-2, 5PS2-1 (select 2 of 3)
6	How objects moveeverywhere, motion (kinetic energy) as related to objects in solar system, gravity and orbital motion, unbalanced forces & collisions, can we get hit by an asteroid? MS-PS2-2, MS-PS3-1, MS-PS2-1 * <i>Legends of the Night Sky: Perseus and Andromeda (18min)</i> The Greek tale can be included in alignment with study of mythology
MS	Rotation vs. revolution with visuals, focus on movements of the moon as compared to Earth and Sun, explore north pole views vs. side views vs. view from Earth in diagrams, observe the past 24 hours and make predictions for the moon next week(s) MS-ESS1-1, MS-ESS1-3 & MS-ESS1-2 (supporting) and SS.H.1.6-8 &V using Elgin Natl. Watch Company as example
any	Optional: Delve into the history of the Elgin Natl. Watch Company and how the Observatory here was used to tell time to set the watches (social studies and science integrated) with less ESS1-1, 1-2

Planetarium lesson ideas for high school classes Note: any lesson above can be modified and used for HS		
Lesson 1	*Legends of the Night Sky: Perseus and Andromeda:	
	The Greek tale comes alive! Included is the connection to our night sky under the dome.	
Lesson 2	Electromagnetic spectrum : nuclear fusion, spectroscopy with spectral tubes, Doppler Effect and red shift maybe excerpts from * <i>Cosmic Colors</i>	
Lesson 3	Observational astronomy: Sky map reading with practice identifying constellations, Observe daily and/or yearly motion of stars and planets, retrograde motion and phases of planets	
Lesson 4	Effects of Earth's Revolution: seasons, tides, Kepler's Laws of planetary motion, Newton's Universal Gravitation, can include extra-solar planets	
Lesson 5	The Moon: Phases explained & demonstrated, solar and lunar eclipses, exploration, *Tribute to Apollo 11 and possibly excerpts of *Earth, Moon and Sun	
Lesson 6	Telescopes and history of Astronomy: Contributions of Copernicus, Ptolemy, Galileo, Newton & KeplerTwo Small Pieces of Glass**Galileo, Power of the Telescope	
Lesson 7	Astronomical Coordinates: A look at how astronomers measure the sky (ecliptic, celestial equator, right ascension and declination), and movement of objects across them, can incorporate planetary movement patterns, precession ("Age of Aquarius"), use of astrolabe	

Lesson 8	Solar System Objects: A look at comets, meteoroids and asteroids and how they compare; scale of solar
	system in our galaxy
Lesson 9	*Chasing the Ghost Particle: the lowdown on neutrino studies at the south pole
Lesson 10	* The First Stargazers: A look at ancient astronomy up to modern day
Lesson 11	*Sky Wars, Battles of Discovery addresses misconceptions, facts and evidence, astrology vs. astronomy

Full dome video programs projected on entire dome. These videos can be for (almost) any grade level.		
Kdg	*Tribute to Apollo 11 (7min) *Losing the Dark (6 min) PSA on light pollution, *A to Z Astronomy (24 min)	
0	Each letters' connection to the cosmos	
1	*Flight Adventures (22min) aeronautics, inventors, NASA models, *Losing the Dark (6 min) PSA on light	
	pollution, *The Moon (25min) Boy watches the Moon *A to Z Astronomy (24 min) Each letters' connection	
	to the cosmos	
2	*Pluto Story(7 min): Our 8 planets (not 9) and why, extra-solar planet discovery, *Rusty Rocket's Last Blast	
	(30min) tour of solar system, *Losing the Dark (6 min) PSA on light pollution, *A to Z Astronomy (24 min)	
	Each letters' connection to the cosmos * <i>Constellations (23 min)</i>	
3	*Magic Tree House-Space Mission, (30 min): (based on M.P. Osbourne series) astronauts & exploration,	
	scale of SS, stars, * <i>Transit of Venus</i> (7 min) info on 2012 event, * <i>Losing the Dark (6 min)</i> PSA on light	
	pollution, *It's about Time (25 min) The history and facts of keeping time *Constellations (23 min)	
4	*Earth, Moon and Sun(25min): notable patterns and movement of stars, sun and moon, Navajo fables (oral	
	traditions) with Coyote. *Dawn of the Space Age (history of space exploration), *Did an asteroid Really Kill	
	the Dinosaurs (25 min), evidence and effects, *Transit of Venus(7 min) info on 2012 event, *Losing the	
	Dark (6 min) PSA on light pollution, *Constellations (23 min)	
5	*Two Small Pieces of Glass(20 min)s, or *Galileo: Power of the telescope (28min): function, uses, history of	
	the telescope, *Dawn of the Space Age(35min) (history of space exploration), *Did an asteroid Really Kill	
	the Dinosaurs (25 min), evidence and effects, *Transit of Venus(7 min) info on 2012 event, *Losing the	
	Dark (6 min) PSA on light pollution, *Constellations (23 min)	
0	*Cosmic Colors (31 min): Electro-magnetic energy, *Dawn of the Space Age, (35min) history of space	
	exploration, "Iransu of venus(/ min) into on 2012 event, "Losing the Dark (6 min) PSA on light pollution,	
	*Legends of the Night Sky: Perseus and Andromeda (18min) The Greek tale,	
MS or	*The First Stargazers (20 min) a look at ancient to modern astronomy, *Chasing the Ghost Particle:	
HS	Neutrino studies at the South Pole (26min) current research info, *Sky Wars: Battles of Discovery (25min)	
	exploring common misconceptions, fact vs. fiction or opinions * Solar Quest (10min)Sun documentary,	
	*SunStruck(22m) basic Sun facts, *Transit of Venus(7 min) info on 2012 event, *Mystery of Dark Matter	
	(30min) delves into dark matter, *Losing the Dark (6 min) PSA on light pollution, *Hot Universe (31 min)	
	EMS energy and black holes, *Legends of the Night Sky: Perseus and Andromeda (18min) The Greek tale	

Program Times: Lessons in the planetarium are 55-60 minutes in length

Seating Capacity: Max 55 total (Fewer is better for visibility during full dome videos)

Accessibility: The building is handicapped accessible and can accommodate up to three wheelchairs

U-46 Scheduling: Visits & buses are scheduled by the U-46 Planetarium. Teachers request a lesson through the electronic sign up in August and will be assigned a time/ date. Multi-level (split) classes see the LOWER grade level show presented with enrichment.

*Full Dome: full dome (italicized) shows project video across most of dome surface