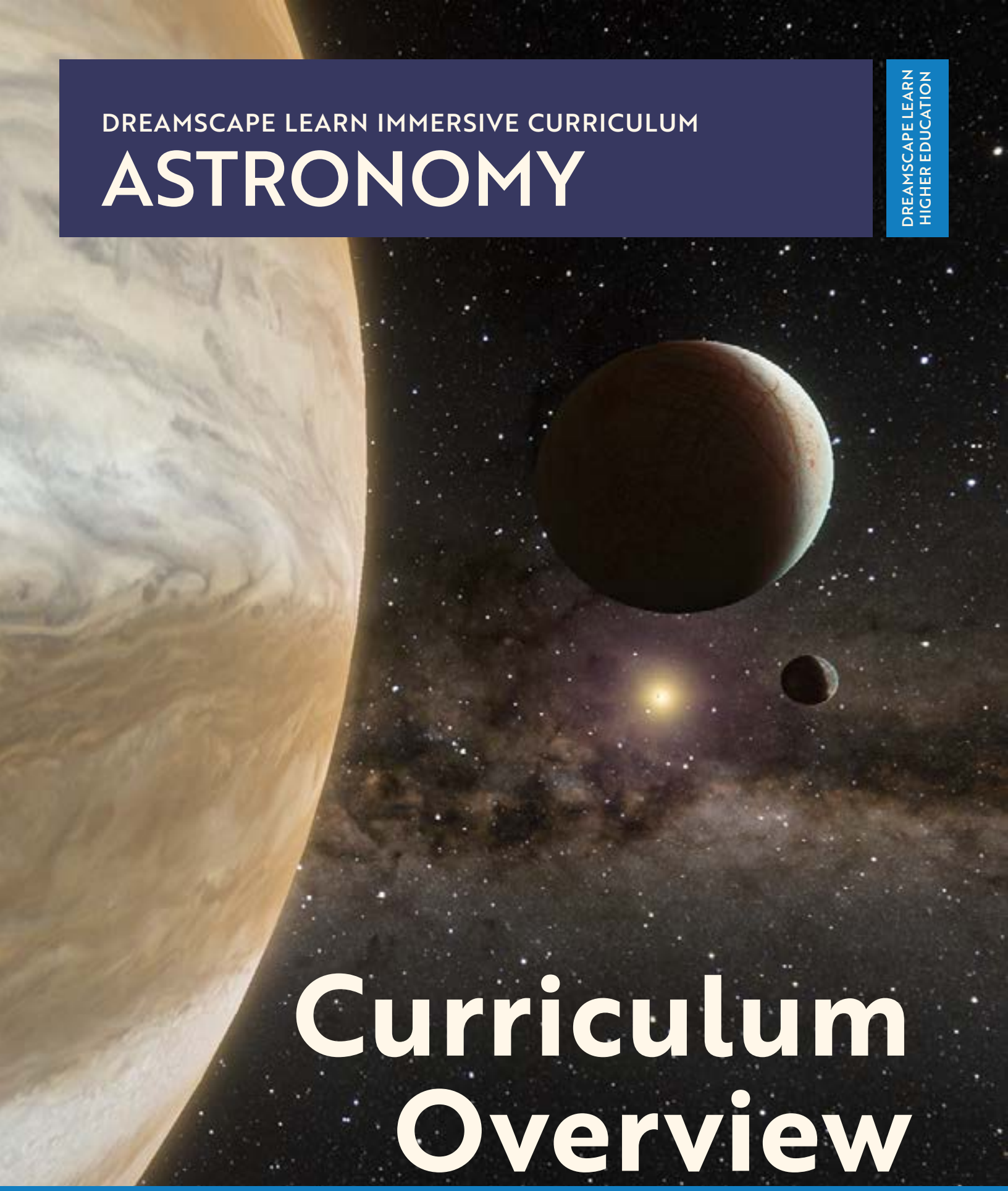
DREAMSCAPE LEARN IMMERSIVE CURRICULUM

ASTRONOMY

DREAMSCAPE LEARN
HIGHER EDUCATION



Curriculum Overview

DREAMSCAPE
LEARN™

What is Dreamscape Learn's Immersive Curriculum?

Dreamscape Learn (DSL) is a new way of learning that combines Hollywood storytelling, advanced pedagogy, and immersive technology.

The Astronomy learning sequence begins with an immersive experience in which students step inside the Center for Planetary Observations (CPO). Guided by the CPO Director, Professor Thompson, students explore the mysteries of the night sky, until a routine observation reveals an unexpected object. As events unfold, students collect and analyze data to build an evidence-based understanding of the object and determine whether it is a newly discovered planet, or a potential threat to Earth.

In the classroom, the mission continues!

Students use data collected during the immersive experience to characterize astronomical phenomena, build and test models, and interpret potential outcomes. Working collaboratively, they analyze findings and draw evidence-based conclusions that shape the next phase of the storyline.

Across the curriculum, Dreamscape Learn provides repeated opportunities for students to practice core astronomy skills while developing scientific reasoning, quantitative analysis, and teamwork—mirroring how scientists investigate complex problems and refine solutions in the real world.



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THE WHITETAIL MISSION: AT A GLANCE

ACT 1: AN UNEXPECTED DISCOVERY

Students discover a mysterious new object in the night sky and begin investigating whether it poses a threat to Earth. Using astronomical observations and measurements, students determine whether the object is celestial and begin tracking its position and motion.



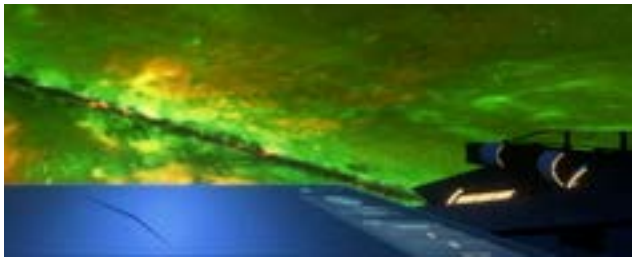
ACT 2: FAR SIDE OF THE MOON

Students travel to the far side of the Moon to gather new observations of the mysterious object. Using coordinate measurements and models, students investigate its location, motion, and trajectory to determine where it is headed.



ACT 3: A TAIL OF ICE OR FIRE

Students get a closer look at the mysterious object as new clues about its identity emerge. Using spectroscopy and models of orbital motion, students investigate its composition and behavior to determine what kind of object it is and predict how it will move through the Solar System.



ACT 4: OPPORTUNITY OR EMERGENCY

Students discover the mysterious object is an interstellar comet that may be older than our Sun—an extraordinary scientific opportunity that also threatens Earth. Using evidence from past impacts and craters, students investigate the consequences of a collision and quantify the risk to Earth.



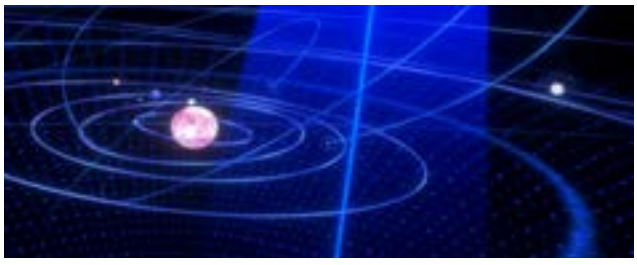
ACT 5: DEFLECTING DISASTER

Students discover the comet has split in two, increasing the uncertainty surrounding a potential impact with Earth. Using evidence from past impacts and planetary defense missions, students evaluate the consequences of an impact and investigate strategies for safely deflecting the comet.



ACT 6: THE FINAL COUNTDOWN

After a failed deflection attempt, students discover the comet will actually miss Earth. but a nuclear strike threatens to turn it into hundreds of dangerous fragments. In a final race against time, students redirect the strike, save Earth, and preserve the opportunity to study the interstellar comet as it passes.



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THE MISSION-DRIVEN LEARNING CYCLE

Each act begins with an immersive experience that advances the mission and introduces new questions, evidence, or challenges. During Rewind & Reflect, students discuss what they observed, make sense of new evidence, and identify what they need to investigate next. Students then continue the mission through two connected labs, where they earn scientific certifications, use those skills to investigate the mission challenge, and make evidence-based decisions that move the story forward.

EXPERIENCE & REFLECT

~30 MINUTES

IMMERSIVE EXPERIENCE

20 MINUTES



REWIND & REFLECT

15 MINUTES



LAB A

~120 MINUTES

CERTIFY
45 - 60 MINUTES



INVESTIGATE
45 - 60 MINUTES



DECIDE
20 MINUTES



LAB B

~120 MINUTES

CERTIFY
45 - 60 MINUTES



INVESTIGATE
45 - 60 MINUTES



DECIDE
20 MINUTES



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A COMPLETE INSTRUCTIONAL PACKAGE

Every act of Dreamscape Learn Astronomy is supported by a coordinated set of instructional resources that connects immersive experiences with laboratory investigations. Together, these materials help students develop and apply astronomical knowledge and data analysis skills to advance the mission narrative.



MISSION OVERVIEW

Outlines the mission storyline, act summaries, and suggested pacing.



MISSION LEADER GUIDES

Provide lab setup instructions, learning objectives, facilitation strategies, answer keys, and student feedback.



REWIND & REFLECT INSTRUCTIONAL SLIDES

Guide class discussions to reflect on immersive experiences, share observations, and prepare for the investigation.



DIGITAL DATA WORKBOOKS

Google Sheets for recording observations, analyzing data, creating models, and documenting evidence.

Each lab includes three activities: Certify, Investigate, and Decide.



CERTIFY

Students develop and demonstrate the scientific skills needed for the investigation, earning a CPO Certification.



INVESTIGATE

Students apply their certified skills to collect, analyze, and interpret evidence related to the mission.



DECIDE

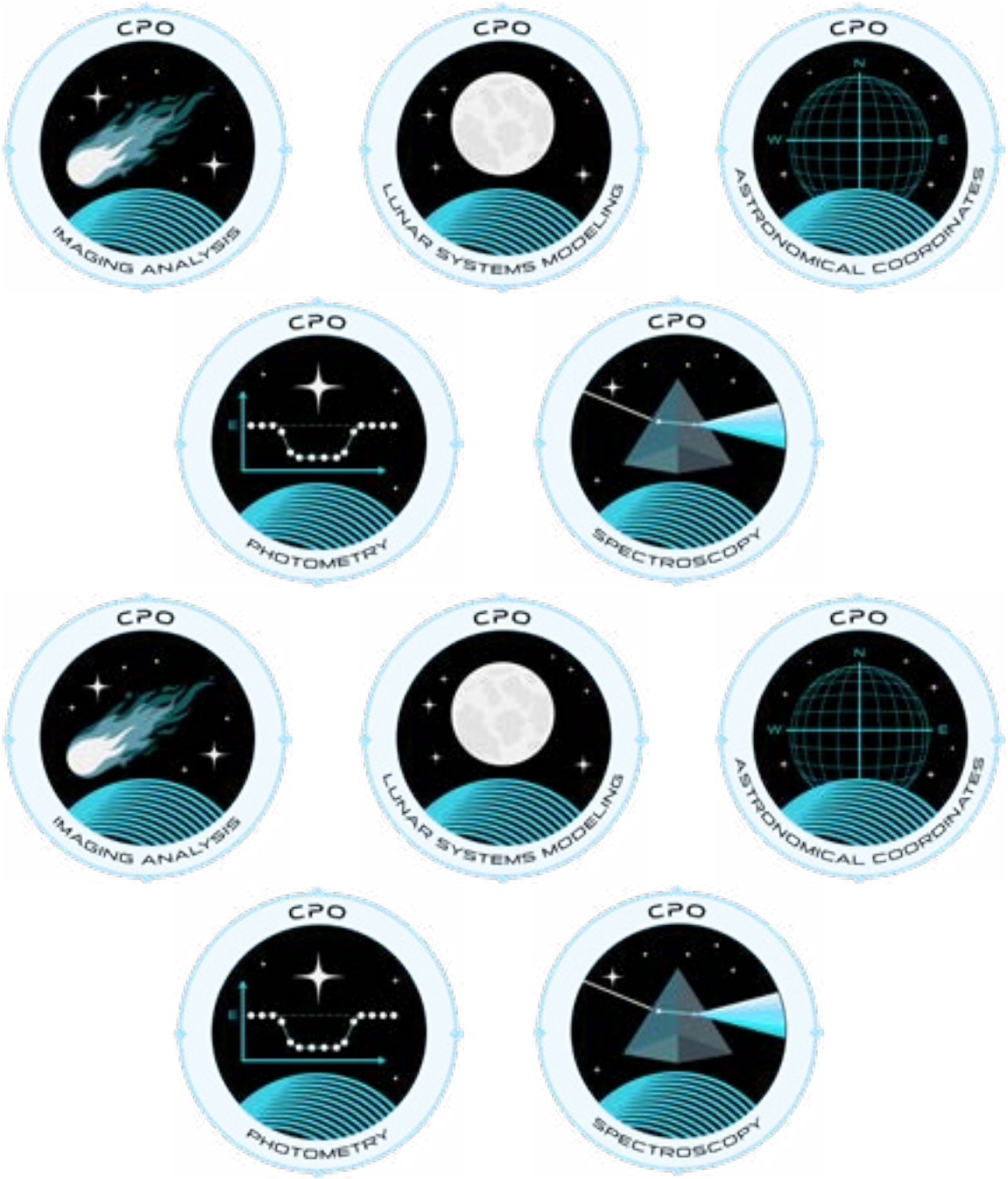
Students use evidence to make conclusions, predictions, or recommendations that advance the Whitetail investigation.

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CPO CERTIFICATIONS

Throughout the Whitetail mission, students earn ten CPO Certifications representing specialized astronomical skills they will use to investigate the universe. Each certification prepares students with new expertise they will put to work in the mission.

These certifications build across the course. As the investigation becomes more complex, students draw upon previously certified skills while developing new ones, combining multiple forms of astronomical evidence to characterize the mysterious object, model its behavior, and make evidence-based decisions.



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ACT 1
An Unexpected Discovery

In this act, students will...

LAB 1A

- Analyze digital astronomical images to identify distinguishing features of celestial bodies and visual artifacts, including light intensity and shape.
- Develop and apply rule-based criteria to distinguish celestial objects from visual artifacts in astronomical images.
- Describe measurable properties of Solar System objects, including size, distance, and angular size.
- Construct and use physical and mathematical scale models to represent planetary distances and diameters.
- Calculate and compare angular sizes of Solar System objects using appropriate equations.
- Apply models to evaluate whether an unknown object could plausibly be a planet.
- Construct and communicate a scientific claim about the nature of an unknown astronomical object using observational data, quantitative evidence, and scientific reasoning.

LAB 1B

- Describe the relationships among the Sun, Earth, and Moon that produce lunar phases.
- Identify and record illumination patterns on the near and far sides of the Moon.
- Construct and use physical and graphical models to represent how lunar illumination changes over time.
- Calculate the percentage of surface illumination on both sides of the Moon and relate those values to lunar phase.
- Calculate and compare the angular sizes of the Sun and Moon to predict whether a solar eclipse will be total or annular.
- Use illumination data and angular size calculations to determine the optimal observation window for a lunar telescope.
- Evaluate how a predicted solar eclipse could affect lunar telescope observations using illumination data, angular size calculations, and geometric reasoning.

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ACT 2
Far Side of the Moon

In this act, students will...

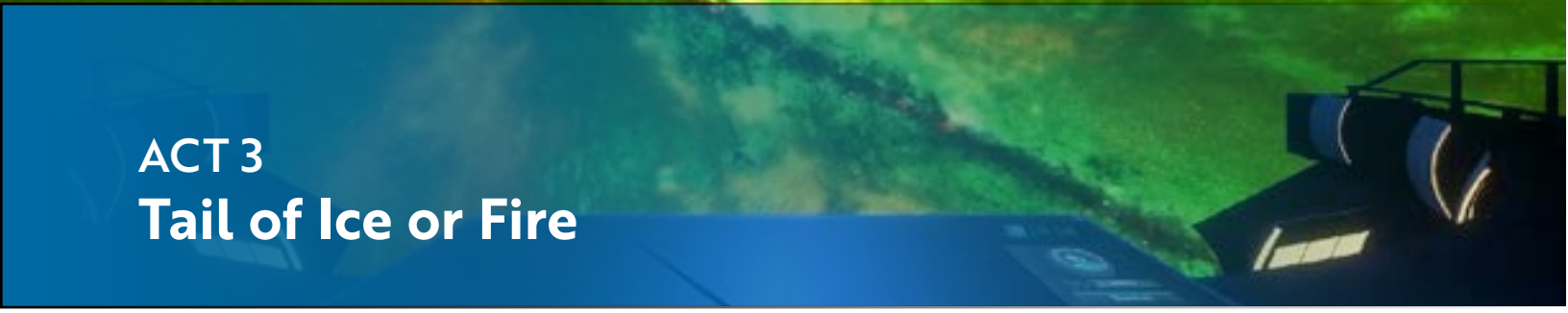
LAB 2A

- Distinguish between horizon and equatorial coordinate systems and explain when each is appropriate for astronomical observations.
- Identify and compare the positions of celestial objects using altitude, azimuth, right ascension, and declination.
- Analyze coordinate data collected from different locations and times to identify patterns in the motion of a celestial object.
- Plot equatorial coordinates on a star chart to reconstruct the predicted past trajectory of an unknown celestial object and identify the constellations along its path.
- Evaluate observatory locations and observing conditions to recommend which observatory archives should be prioritized when searching for earlier images of an unknown celestial object.

LAB 2B

- Describe measurable properties of celestial objects using apparent magnitude as an indicator of observed brightness.
- Estimate and compare the apparent magnitudes of celestial objects using astronomical images and reference stars.
- Construct and interpret graphs to identify changes in a celestial object's apparent magnitude over time.
- Analyze the relationship between apparent magnitude, brightness, and distance to infer whether a celestial object is moving toward or away from Earth.
- Apply observational evidence to evaluate how changes in brightness support predictions about a celestial object's motion.
- Use qualitative and quantitative evidence to justify conclusions about the behavior and location of an unknown celestial object.
- Communicate a scientific claim supported by observational data and reasoning.

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ACT 3
Tail of Ice or Fire

In this act, students will...

LAB 3A

- Describe how an object's orbital shape, distance from the Sun, and orbital size influence its motion.
- Apply Kepler's laws to predict changes in the velocity and orbital motion of celestial objects.
- Construct and interpret mathematical models that relate orbital size to orbital period.
- Analyze orbital data to estimate the semi-major axis, perihelion, and aphelion distances of planetary orbits.
- Compare planetary orbits with the comet's projected trajectory to identify potential orbital intersections.
- Use qualitative and quantitative evidence to evaluate potential interactions between Whitetail and objects in the Solar System.
- Communicate a scientific claim supported by observational data and reasoning.

LAB 3B

- Calculate the speed of a celestial object using observational data.
- Calculate and compare a celestial object's speed with the Sun's escape speed at different distances to evaluate whether the object is gravitationally bound to the Solar System.
- Analyze quantitative evidence to determine whether a comet is gravitationally bound to the Sun.
- Apply mathematical models of orbital motion and gravity to predict the future behavior of a celestial object.
- Evaluate evidence to determine the likelihood that Whitetail will remain in or leave the Solar System.
- Use qualitative and quantitative evidence to justify conclusions about Whitetail's trajectory and long-term motion.
- Communicate a scientific claim supported by observational data and reasoning.

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ACT 4
Opporuntity or Emergency

In this act, students will...

LAB 4A

- Distinguish impact craters from landforms created by volcanism, erosion, and tectonic activity using observable surface features.
- Analyze images of planetary surfaces to determine the relative ages of craters and other geological features.
- Compare planetary surfaces to infer their relative ages based on crater density and evidence of resurfacing.
- Classify impact craters as preserved, partially degraded, or heavily degraded using observational evidence.
- Evaluate planetary images to identify preserved craters suitable for scientific analysis.
- Use qualitative evidence to justify crater classifications and interpretations of planetary surface history.
- Communicate a scientific claim supported by observational evidence and reasoning.

LAB 4B

- Apply an impact simulation model to predict crater diameters from an impactor's physical properties.
- Compare predicted crater diameters with observed crater data to evaluate the accuracy of a scientific model.
- Calculate and interpret percent error to assess the reliability of model predictions.
- Use validated models to predict the crater diameter and impact energy of Whitetail under multiple impact scenarios.
- Analyze how an impactor's composition influences crater size and impact energy.
- Evaluate evidence to determine whether an impact model is sufficiently accurate for predicting real-world impact hazards.
- Communicate a scientific claim supported by quantitative evidence and mathematical modeling.

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ACT 5
Deflecting Disaster

In this act, students will...

LAB 5A

- Calculate the mass of a celestial object using its dimensions and estimated density to evaluate how its composition influences its potential impact on Earth.
- Compare the mass of an incoming celestial object with the mass of the atmospheric column in its path to predict whether it will survive atmospheric entry.
- Construct and interpret mathematical models relating impact kinetic energy to atmospheric optical depth and changes in Earth's surface temperature.
- Analyze graphical models to predict the severity and duration of atmospheric effects following an impact, including reduced sunlight and surface cooling.
- Evaluate simulated fragmentation outcomes for different material compositions to determine whether a planetary defense intervention could eliminate the threat of impact.

LAB 5B

- Analyze the relationship between stellar luminosity, distance, and temperature to determine where different materials can condense into solids within a planetary system.
- Use models of condensation boundaries to predict how a comet's composition reflects its formation location and the properties of its parent star.
- Analyze the chemical composition of a comet to evaluate evidence about its formation environment and possible origin.
- Construct and interpret graphs of radiometric isotope data to estimate the age of a comet and compare it with the age of the Solar System.
- Compare stable carbon isotope ratios from different astronomical objects to evaluate whether a comet originated within or beyond the Solar System.

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