Course: Astronomy **Unit #2:** The Solar System	**Year of Implementation:** 2025-2026

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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
https://www.nj.gov/education/standards/

- **Unit Standards:**
  - ***Content Standards***
    - **HS-ESS1-1.** Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation
    - **HS-ESS1-2**. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
    - **HS-ESS1-4**. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
    - **HS-ESS1-5** Evaluate the evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
    - **HS-ESS1-6**. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
    - **HS-PS4-5**. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.
    - **HS-PS2-1**. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
    - **HS-PS2-2**. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
    - **HS-PS2-3**. Apply scientific ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

        - **HS-PS2-4**. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
        - **HS-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
        - **HS-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including costs, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
    - ***Science and Engineering Practices***

      The content of this unit will strengthen student skills in the following SEPs.
        - Practice 1 Ask Questions
        - Practice 2 Developing and Using Models
        - Practice 3 Planning and Carrying Out Investigations
        - Practice 4 Analyzing and Interpreting Data
        - Practice 5 Using Mathematics and Computational Thinking
        - Practice 6 Constructing Explanations and Designing Solutions
        - Practice 7 Engaging in Argument from Evidence
        - Practice 8 Obtain, Evaluate and Communicate Information
    - ***21st Century Life & Career Standards***
        - 9.4.12.CI.1 - Demonstrate the ability to reflect, analyze and use creative skills and ideas
        - 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
        - 9.4.12.IML.3 - Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
        - 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
        - 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
        - 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
    - ***English Companion Standards***

- NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
- NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
- NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
- NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
- NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
- NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
- NJSLSA.W3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
- NJSLSA.W4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- NJSLSA.W5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
- NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
- NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.
- NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
- NJSLSA.W9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

        - NJSLSA.W10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
        - WHST.11-12.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
        - Grade 9-10 Companion Standards: https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Companion9-10.pdf
        - Grade 11-12 Companion Standards: https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Companion11-12.pdf
    - ***Interdisciplinary Content Standards***
        - MP.2 - Reason abstractly and quantitatively.
        - MP.4 - Model with mathematics.
        - HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
        - HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.
        - HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
        - HSA-SSE.A.4 - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
    - ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

      Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

      Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction

shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416)

For additional information, see

NJ Amistad Curriculum: ***https://www.nj.gov/education/amistad/about/***

Diversity and Inclusion: ***https://www.nj.gov/education/standards/dei/index.shtml***

- *(Sample Activities/ Lessons):* ***https://www.nj.gov/education/standards/dei/samples/index.shtml***

Asian American and Pacific Islanders:

- ***Asian American and Pacific Islander Heritage and History in the U.S.***
  A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies, literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.

Transfer Goal: Students will be able to independently use their learning to assess the benefits and challenges of continued space exploration.

As aligned with LRHSD Long Term Learning Goal(s): https://www.lrhsd.org/academics/program-of-studies/curriculum

The Lenape Regional High School District Science program, in alignment with the New Jersey Core Curriculum Content Science Standards, prepares our students to become scientifically literate and informed citizens able to function in an increasingly complex society. Through completing our coursework with its emphasis on authentic experiences that enable students to investigate and explain scientific phenomena, our students will be better able to

1. design, critique, and carry out experiments in order to investigate scientific questions and/or propose solutions
2. collect, interpret, and analyze data in order to solve a defined problem
3. apply mathematics to express relationships efficiently and accurately
4. draw evidence-based conclusions from data in order to make informed decisions;
5. construct, interpret, and refine models (scientific and mathematical) to explain the physical and natural world
6. effectively communicate scientific ideas and evidence-based arguments to an appropriate audience through written and oral means
7. evaluate the validity of arguments that rely on scientific reasoning presented in the popular press and informational sources

Enduring Understandings	*Essential Questions*
Students will understand that. . . *EU 1* the diversity of objects within the solar system influences their interactions and evolution over time. *EU2* space exploration is integral to humanity and our understanding of the Earth and solar system.	• *What is the origin, evolution, and future fate of the solar system?* • *What role does space exploration play in shaping our future as a global society?*

Knowledge *Students will know . . .*	*Skills* *Students will be able to. . .*
EU 1 ● that the Big Bang theory is supported by observations of distant galaxies receding from our own, of the measured composition of stars and non-stellar gasses, and of the maps of spectra of the primordial radiation (cosmic microwave background) that still fills the universe. **(HS-ESS1-1, HS-ESS1-2, ESS1.A)** ● that the solar nebula theory is strongly favored as an evolutionary scenario for the origin of the solar system.**(HS-ESS1-1, HS-ESS1-2, ESS1.A)** ● the Sun and planets formed from an interstellar cloud of gas and dust. **(HS-ESS1-2, HS-PS2-2, ESS1.A)** ● there are different regions of the solar system, such as the inner region, outer region, and trans-Neptunian (Kuiper belt) region. **(HS-ESS1-4, ESS1.B)** ● that rings of the Jovian planets did not always exist and were caused by tidal forces. **(HS-PS2-1, PS2.A)** ● collisions were frequent in the early formation of the solar system, causing transformations of moons and planets. **(HS-PS2-3, HS-PS2-4, PS2.B)** ● that the Moon most likely formed from the collision between “Earth” and a relatively large object during the early solar system. **(HS-PS2-4, PS2.B)** ● the Terrestrial planets may have formed from the combining of planetesimals, which formed protoplanets. **(HS-PS2-4, PS2.B)** ● the eight planets of our solar system can be categorized into either a Terrestrial planet or a Jovian planet. **(HS-ESS1-6, ESS1.C)**	*EU 1* ● apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. **(HS-ESS1-6, SEP 4)** ● compare and contrast the theories of the origin of the Universe and Solar System. (**HS-ESS1-1, HS-ESS1-2, HS-ESS1-4, SEP 2,4)** ● demonstrate how the law of conservation of angular momentum contributed to the formation of the solar system **(HS-PS2-2, SEP 2,5)** ● describe how gravity played a part in forming the planets and their rings. (**HS-PS2-1, HS-PS2-4, SEP 1,5,8)** ● evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. **(HS-ESS1-5, SEP 6, 7)** ● apply the concept of the Roche Limit to predict whether or not a moon could exist at a specific distance from its host planet . (**HS-PS2-1, HS-PS2-4, SEP 3,5,8)** ● analyze maps of Mars and the Moon to evaluate cratering patterns. **(HS-PS2-3,HS-PS2-4, SEP 3,4)** ● describe the different theories regarding the formation of the Moon and identify which one is most plausible. **(HS-PS2-4, SEP 2,4,7,8)** ● apply the condensation sequence to the formation and composition of the planets. **(HS-PS2-4, HS-ESS1-6, SEP 2,3)** ● describe the characteristics of the planets and moons in the solar system and list similarities and differences between each. **(HS-ESS1-6, SEP 4,8)**

● Terrestrial planets have some similar characteristics, such as size and density. **(HS-ESS1-6, ESS1.C)** ● Terrestrial planets have some different characteristics, such as atmospheres, geology, weathering, magnetic fields, and moons. **(HS-ESS1-5, ESS2.B; HS-ESS1-6, ESS1.C)** ● Jovian planets have some similar characteristics, such as size, density, rings, magnetic fields, and large moons, and are composed mainly of hydrogen and helium. **(HS-ESS1-6, ESS1.C)** ● most planets have natural satellites, which have large variability in their characteristics. **(ESS1-4, ESS1.B)** ● according to the International Astronomical Union (IAU), Pluto is classified as a dwarf (or minor) planet. **(HS-ESS1-6, ESS1.C)** ● an object, such as Pluto, that is located or discovered in the Kuiper Belt region of the solar system is considered a KBO (Kuiper Belt Object) and TNO (Trans-Neptunian Object). **(HS-ESS1-4, ESS1.B; HS-ESS1-6, ESS1.C)** ● asteroids reside mainly in the Asteroid Belt, located between the orbits of Mars and Jupiter. **(HS-ESS1-4, ESS1.B; HS-ESS1-6, ESS1.C)** ● comets originate from either the Kuiper Belt or Oort Cloud region of space and are called short or long period comets based on their origin and period of revolution. **(HS-ESS1-4, ESS1.B; HS-ESS1-6, ESS1.C)** ● asteroids and comets vary somewhat in their composition. **(HS-ESS1-6, ESS1.C)** ● meteoroids create light streaks called meteors when they enter Earth's atmosphere and are considered meteorites when they hit the ground. **(HS-ESS1-6, ESS1.C)**	● calculate celestial body sizes and densities. **(HS-ESS1-4, SEP 4,5)** ● distinguish between asteroids, meteoroids, comets, and their origins. **(HS-ESS1-4, HS-ESS1-6, SEP 4,5,8)** ● develop a definition of a planet and compare it to the definition provided by the International Astronomical Union (IAU). **(HS-ESS1-4, HS-ESS1-6, SEP 1,4,7)** ● categorize objects in the solar system according to the IAU guidelines. **(HS-ESS1-4, HS-ESS1-6, SEP 1,4,7)** ● analyze the effects and frequency of celestial bodies colliding with the Earth and Moon. **(HS-ESS1-6, (HS-PS2-4, SEP 2,3,4,5)** ● debate whether it is probable that in the lifetime of a human, a significant impact to Earth will occur from a collision between Earth and space debris.**(HS-ESS1-6, HS-PS2-3, SEP 4,7,8)** *EU 2* ● communicate scientific and technical information about the process of development and the design and performance of a proposed process or system. **(HS-ETS1-1, SEP 4,8)** ● compare and contrast the pros and cons of manned versus unmanned space exploration.**(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)** ● describe the success and failures of the various manned and unmanned space missions attempted by various space agencies. **(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)** ● analyze the problems and setbacks that engineers might encounter when planning missions to planets and moons within the solar system. **(HS-ETS1-1, HS-ETS1-3, HS-PS2-3, HS-ESS1-4, SEP 4,7,8)**

● in the past, there have been large planetary impacts that have significantly affected the Earth. **(HS-ESS1-6, ESS1.C)** *EU2* ● having close proximity, or contact, with an object provides information which could not be determined in other ways.**(HS-ESS1-6, ESS1.C)** ● NASA is a public entity that spends money on various projects dedicated to exploring the Universe and advancing scientific knowledge.**(HS-ETS1-1, ETS1.A)** ● space programs such as the ESA, CNSA, RFSA, and JAXA exist and are funded by other countries. **(HS-ETS1-3, ETS1.B)** ● private space programs have been created and are funded by non-public entities for reasons that may be related to self-interest and capitalism.**(HS-ETS1-1, ETS1.A; HS-ETS1-3, ETS1.B)** ● the development and advancement of rocket technology made orbiting the Earth and solar system exploration possible. **(HS-ETS1-1, ETS1.A; HS-ETS1-3, ETS1.B)** ● the United States and USSR competed in an unofficial "space race" that affected the rate at which both space and general technology developed, and much of modern technology exists as a result of that "race." **(HS-ETS1-1, ETS1.A; HS-ETS1-3, ETS1.B)** ● several NASA missions successfully enabled astronauts to explore the Moon for various reasons, which included bringing back samples of the surface for scientific study. **(HS-ESS1-6, ESS1.C)** ● unmanned space exploration, such as the Mars rovers and New Horizons missions, are beneficial to exploration by allowing close-up data collection of solar system	● discuss how technological advances developed throughout and as a result of the space program. **(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)** ● evaluate the success of private enterprise entering the space field. **(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)** ● analyze how the current major goals in the space program can be beneficial to society.**(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)** ● debate the advantages and associated costs inherent in a space exploration program.**(HS-ETS1-1, HS-ETS1-3, SEP 4,7,8)**

objects without the need to plan for human travel. **(HS-ESS1-6, ESS1.C; HS-ETS1-3, ETS1.B)** ● new evidence from current space exploration provides information to scientists that enables them to modify theories about and perspectives on the Universe. **(HS-ESS1-2, ESS1.A)** ● water exists in some form on moons, planets, and space debris (i.e. comets) within our solar system, and not just on Earth. **(HS-ESS1-6, ESS1.C)**	

Stage Two - Assessment

Performance Task:

Other Evidence:

- Quizzes
- Summarizers
- Essays
- Research
- Presentations
- Formal lab write ups
- Discussions
- Diagrams
- Models

- Debate
- CER
- Unit Test

Stage Three - Instruction

Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.** *{place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

PHENOMENON: Can planets evolve over time?

Goal: Students will be able to evaluate physical properties of solar system objects and explain how they evolve over time.

1. Students will observe the picture of Jupiter and its red spot and draw conclusions about the evolution of the spot.**(A/M) (EU1)**
   https://www.sci.news/astronomy/science-jupiters-great-red-spot-shrinking-01926.html Jupiter's Red Spot Is Changing
2. Teacher proposes a discussion question(s) to students: How did the planets form? How did the solar system evolve? **(A/M) (EU1)**
   - Students will brainstorm / Think Pair Share: How was the solar system created, how did it evolve, and how did the planets form? **(A/M) (EU1)**
   - Teacher-led discussions on the theories of the catastrophic and evolutionary origins of the solar system (**A) (EU1)**
   - Teacher-led demonstration on angular momentum **(A/M) (EU1)**
   - Students will compare and contrast the theories of the origin of the solar system **(A/M) (EU1)**
   - Students will draw and explain the solar Nebula process **(A/M) (EU1)**
   - Students will explain the answer to the question: Why are planets and debris aligned closely within the same plane? **(A/M) (EU1)**

3. Brainstorm: Students will develop a definition of a planet and compare it to the definition provided by the International Astronomical Union (IAU). **(A/M) (EU1)**
4. Teacher-led discussion and notes on the Terrestrial Planets and their moons. **(A/M) (EU1)**
    - Students should make a list of all characteristics of each terrestrial planet on whiteboard from their prior knowledge
    - Teacher will provide notes on terrestrial planets (**A) (EU1)**
    - Students will analyze whether their prior knowledge was correct/incorrect **(A/M) (EU1)**
5. Activity: Terrestrial Globes and Moon rocks analysis.
    - Students will locate physical features and properties on the globes, as well as where they would land an exploration team **(A/M/T) (EU1, EU2)**
    - Simulated moon rocks will be observed and compared/contrasted to Earth rocks **(A/M/T) (EU1, EU2)**
6. Teacher-led discussion and notes on the Jovian Planets and their moons. **(A/M) (EU1)**
    - Students should make a list of all characteristics of each terrestrial planet on whiteboard from their prior knowledge
    - Teacher will provide notes on Jovian planets, their moons, and Pluto (**A) (EU1)**
    - Students will analyze whether their prior knowledge was correct/incorrect **(A/M) (EU1)**
7. Activity: Students will compare and contrast Terrestrial and Jovian planets using a Venn Diagram **(A/M) (EU1)**
8. Activity: Students will calculate celestial body sizes and densities **(A/M) (EU1)**
9. Activity: Students will complete the following Starry Night Activities **(A/M/T) (EU1)**
   http://www.starrynighteducation.com/products-astronomy-education-high-school.html
    - C1: The Inner and Outer Planets of the Solar System
    - C2: Motion of the Planets
    - C3: The Moons of the Planets
    - C4: Pluto as a Dwarf Planet

PHENOMENON: How can our species protect Earth from space debris?
Goal: Students will be able to hypothesize what would happen to Earth (or other celestial body) if it was impacted by another object and develop ideas to mitigate damage or avoid a collision.
1. https://thewonderofscience.com/phenomenon/2018/7/9/protecting-the-earth-from-killer-asteroidsProtecting Earth from Killer Asteroids (discussion) **(A/M) (EU1)**
2. Teacher-led discussion and notes on space debris (asteroids, comets, meteoroids, etc.) **(A) (EU1)**
3. Activity: Students will create a diagram to distinguish between asteroids, meteoroids, comets, and their origins **(A/M) (EU1)**
4. Activity: Students will analyze the effects and frequency of celestial bodies colliding with the Earth and Moon **(A/M) (EU1)**
5. Debate/Discussion: Students will debate whether it is probable for space debris to make a significant impact on Earth in a human's lifetime. **(M/T) (EU 1)**

6. Activity: Students will analyze and determine, given a map of craters on the Moon or Mars, the size and angle of impact.
7. Videos for Review: Crash Course Astronomy **(A) (EU1)**
https://www.youtube.com/watch?v=0rHUDWjR5gg&list=PL8dPuuaLjXtPAJr1ysd5yGIyiSFuh0mIL
- Episodes 20-23: Asteroids, Comets, Oort Cloud, Meteors

8. Activity: Students will complete the following Starry Night Activities **(A/M/T) (EU1)**
http://www.starrynighteducation.com/products-astronomy-education-high-school.html
- D1: Asteroids of the Main Belt
- D2: Comets and Meteors
- D3: Near Earth Objects

PHENOMENON: Rocket Explosion-https://www.youtube.com/watch?v=K5Vw2ZDe-G0 Challenger
Goal: Students will analyze the development of space technology and exploration and describe how society has been impacted.
1. Teacher-led discussion question: "How has space exploration affected you?" **(A/M) (EU2)**
2. Teacher-led notes about NASA and other space programs **(A) (EU2)**
3. Activity: Students will analyze space exploration
- Students will research and create a list/timeline/summary of important missions of space exploration and discoveries that occurred **(A/M) (EU2)**
- Students will describe the success and failures of the various manned and unmanned space missions attempted by various space agencies **(A/M) (EU2)**
- Students will compare and contrast the pros and cons of manned versus unmanned space exploration **(A/M/T) (EU2)**
- Students will identify and summarize technological advances that developed as a result of the space program **(A/M) (EU2)**

4. Debate: Students will evaluate and then debate the success of private enterprise entering the space field **(A/M/T) (EU2)**
5. Activity: Students will complete the following Starry Night Activities **(A/M/T) (EU2)**
http://www.starrynighteducation.com/products-astronomy-education-high-school.html
- I1: Artificial satellites and the Space Environment
- I2: Great Explorations in the Solar System
- I3: Tools of the Astronomer

6. Suggested optional videos/movies/books **(A/M) (EU2)**
- The Martian, by Andy Weir
- Hidden Figures, by Margot Lee Shetterly https://www.nasa.gov/sites/default/files/atoms/files/modernfigures_toolkit_interactive_0.pdf
- Apollo 13, by Jim Lovell and Jeffrey Kluger
- The Right Stuff, by Tom Wolfe
- October Sky, by Homer Hickam
- Contact, by Carl Sagan

- Interstellar, directed by Christopher Nolan

Pacing Guide

{This chart will be identical in all of the units for this course.}

Unit #	***Title of Unit***	***Approximate # of teaching days***
1	Our Place in Space	40
2	The Solar System	30
3	The Stars	40
4	The Universe	25

Instructional Materials

{Provide a list of all instructional materials used for this curriculum here. Items such as chromebooks and teaching tools such as Peardeck, EdPuzzle, etc… should NOT be listed.}

- Starry Night High School - web/chromebook version
- Fully equipped science lab
- Simulated Moon Rocks
- Planet Globes
- Photographs or maps of planetary surfaces
- Markers
- Crayons
- Colored Pencils
- Rulers
- Poster Paper
- Graph Paper
- Anchor Paper
- Plain Paper
- Scissors
- Spectrum Tube Power Supply
- Calculators
- Movies or books:
    - The Martian, by Andy Weir
    - Hidden Figures, by Margot Lee Shetterly
      https://www.nasa.gov/sites/default/files/atoms/files/modernfigures_toolkit_interactive_0.pdf
    - Apollo 13, by Jim Lovell and Jeffrey Kluger
    - The Right Stuff, by Tom Wolfe
    - October Sky, by Homer Hickam
    - Contact, by Carl Sagan
    - Interstellar, directed by Christopher Nolan

Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.

Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.

English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.

Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.

Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.