Lockheed Martin Space Curriculum

	Lesson Title	Overarching Phenomena (Unit)	Essential Question(s)	Engineering Activity	Potential Classes*	Career Focus	High Level Lesson Overview
1	Golden Record	Our Place in the Universe	How do we communicate with extraterrestrial life? What is important for us to share about our planet?	Designing a Golden Record	Biology Earth Science Environmental Science	Project Scientist; Principal Investigator; Data Analyst; Mission Design Engineer	Students will learn about the Golden Record on the Voyager Mission and think about what they would want to include in a message sent out in the universe.
2	Many Minds, One Mission	Human Exploration and the Need to Explore Other Planets	Why is space exploration one adventure with many heroes? How do scientists and engineers collaborate?	Many Minds, One Mission: Collaborative Engineering Design Challenge	Earth Science Engineering Environmental Science	Architectural Engineer; Material Scientist; Structural Engineer; Health and Safety Specialist	Students will work together to complete a design challenge with a twist: each student has their own mission on the project and they will need to work together to complete the design, just as scientists and engineers work together to design missions to study space.
3	I Will Survive	Astronauts and Humans in Space	How does the human body maintain balance and function? How do astronauts survive in space? What happens to the human body in space?	Ultraviolet Bead Experimentation	Biochemistry Biology Chemistry Earth Science	Astronaut; Radiation Protection Technician	Students will look at some of the potential health hazards involved in space travel and will design a radiation shield to protect their “astronaut” from being exposed to ultraviolet light.
4	It’s Not Rocket Science, It’s Rocket Design	Spacecraft Development and Manufacturing	What components make an effective and efficient spacecraft? What criteria and constraints need to be considered for an effective and efficient spacecraft?	Rocket Design Challenge	Chemistry Engineering Physics	Avionics Design Engineer	Students will design their own rockets after learning about the history of rocketry and understanding the constraints of real spacecraft design (time, funding, safety, etc.)
5	Birds Eye View	Studying Earth with New Technologies	How can we use technology in space to better understand the world around us?	Satellite Investigation	Biology Computer Science Earth Science Environmental Science	Aerospace Engineer; Software Engineer	Students will become familiar with the different types of satellites for each mission purpose. Students will design their own satellite based on real Lockheed Martin satellite missions.

6	3...2...1… Liftoff!	Spacecraft Development and Manufacturing	How do rockets work?	Rocket Fuel Ignition	Chemistry Engineering Physics	Systems Engineer; Chemical Engineer	Students will test their own rocket propellant after observing several chemical reactions that demonstrate how thrust, oxidizer, and fuel are essential components in rocket propellant.
7	Satellite Orbit: How Do You Planet?	Spacecraft Launch and Sustainability	How do satellites work? How do you keep a satellite in orbit around our planet?	Orbital Investigation	**Math** Earth Science Engineering Physics	Computational Scientist; Data Analyst	Students learn about the mathematics involved in orbital configuration. Students model the launch of a spacecraft with a modeling simulation.
8	Houston, We Have a Satellite	Spacecraft Launch and Sustainability	How do scientists on the ground communicate with spacecraft? How is it possible to hear the tiny whisper of a signal from a spacecraft so far away? How is math used as an important tool for communication?	Mathematics Modeling	**Math** Engineering Physics	Antenna Engineer	Students will learn how antennas work through mathematical modeling. They will apply this knowledge to understand how satellites can communicate with Earth from very far away.
9	Getting to the Red Planet	Colonizing Mars	How do you get to Mars? How do we create a habitat for survival in deep space? How do we get that habitat into deep space?	Mars Base Camp: Lunar Space Station Home	Earth Science Engineering Physics	Mechanical Engineer; Materials Engineer	Students will work in small groups to design a Lunar Space Station that will serve as the Mars Base Camp that will eventually launch a manned mission to Mars. Students will learn about heavy load rockets as a consideration for creating their living quarters in space.
10	Tiny Houses on Mars	Colonizing Mars	What do we need to survive on Mars?	Manned Mission to Mars	Earth Science Engineering Physics	Biologist; Botanist	Students will create a habitat that will enable humans to survive the long mission to Mars. Students will use TinkerCAD to create a Mars Tiny House.

While potential classes listed are all in the STEM (science, technology, engineering, mathematics) field, many of these lessons are interdisciplinary and can also be taught in a History, English, or Art classroom. Classes listed as **Math (in bold) are considered math-heavy and students' prior math experience should be considered. Lessons are aligned to the California Next Generation Science Standards (NGSS) and in the teacher matrix we've included suggestions for which science classes each of the lessons would be most closely tied to. Suggestions for extensions and prior knowledge development are included with each lesson.*

Resources for Lockheed Martin volunteers

***Recommendation**: Lesson 6 (Birds Eye View) is recommended for a Lockheed Martin employee to share their own knowledge as a guest speaker about satellite design.*