HAS Online Course Curriculum Outline 2025-2026

Onboarding - Getting Started

Overview: In this module, students will be introduced to the HAS online course and will complete a series of important onboarding tasks to help ensure they are prepared for the adventures in the rest of the course. Part of these preparations will include setting up their engineering design notebook (EDN), which is an important part of this course and will be used for every assignment.

Course Introduction Tasks

Task:	***Purpose:***
1 | Course Introduction & Checkpoint	Get familiar with the HAS Online course, policies and procedures.
2 | Update Profile Page	Update your course profile.
3 | Getting to Know You	Introduce yourself to your Technical Reviewer and Peers.
4 | Congressional Districts Survey	Help the HAS Team understand and improve our outreach and recruiting practices.
5 | Water Cooler	Become Familiar with the Casual Forum for Students.

Engineering Design Notebook Set-Up

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How do engineers think, plan and solve problems, and how can I start thinking like one?	▪ Set up an organized engineering design notebook to track ideas, processes, notes and project work.	▪ Documenting ideas using an engineering design notebook.
Why is documenting ideas and design decisions essential to engineering work?	▪ Describe the key stages of the engineering design process and how they are used by real engineers. ▪ Understanding and applying the engineering design process.	▪ Reflect on personal experiences with problem-solving using the engineering design process. ▪ Reflecting on personal problem-solving experiences.
How does using the engineering design process help solve real problems and when have I used it myself?	▪ Communicate their understanding of engineering practices, advantages and disadvantages of using models and the differences between scientific hypotheses, theories and laws.	▪ Communicating Ideas. ▪ Identify tasks and roles typical of an engineer's workday.

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,B,H), 3(A), 4(B), 6(A), 8(C,D), 10(I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 1 - Life in Explore mode

Summary: In this module, students explore how we study the universe without leaving the ground. Through coding, modeling, data analysis, and NASA-inspired challenges, they investigate planetary defense, habitability, orbital motion, and satellite-based discovery. Along the way, they will build key STEM skills and consider future careers in space exploration - all from an Earth-based perspective.

Mission 1, Task 1 - Planetary Defenders

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How can we protect earth from asteroid threats using current and emerging technologies?	▪ Explain the purpose and importance of planetary defense initiatives, including NASA's DART mission.	▪ Critical thinking and problem solving
What are the strengths and limitations of current asteroid deflection strategies like NASAs DART mission?	▪ Evaluate the effectiveness of current asteroid deflection technologies using scientific data and models. ▪ Identify strengths and gaps in global planetary defense strategies based on current capabilities.	▪ Engineering Design Evaluation ▪ Persuasive communication for a real-world audience
Why should governments invest in planetary defense, and what could happen if we don't?	▪ Construct a persuasive policy brief and pitch advocating for continued investment in planetary defense ▪ Communicate scientific and engineering concepts clearly to a non-technical, decision-making audience.	▪ Ethical reasoning and civic decision-making

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(A,C,D,E), 2(A,B,G), 3(D), 4(A,B), 5(A,C),6(A), 7(A), 8(B,C), 9(D,E), 10(B,C,D,E), 11(H,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 1, Task 2 - Are We Alone? Exploring Life in the Cosmos.

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What makes a planet truly habitable and how do we decide?	▪ Describe major scientific factors that influence planetary habitability	▪ Scientific Modeling and quantitative reasoning
How can we use scientific reasoning to search for life beyond earth?	▪ Use the Drake equation as a framework for discussing the likelihood of extraterrestrial life. ▪ Calculate habitable zones around stars using available data	▪ Data Analysis and decision making ▪ Evaluating criteria and designing rubrics
Is it possible to predict life elsewhere in the galaxy using data and models?	▪ Evaluate exoplanets based on scientific criteria and justify a recommendation.	▪ Argumentation supported by evidence ▪ Systems thinking and astrobiology literacy

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,B,G), 3(C,D), 4(A,B), 5(A,C), 6(A), 7(A,B,C,E), 8(B,C), 10(C,I), 11(E,I)

Mission 1, Task 3 - Decoding the Cosmos: Satellites and Telescopes

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How do satellites and telescopes help us understand Earth and the Universe?	▪ Explore how satellites and telescopes use different wavelengths to gather data	▪ Research design and question formulation
Why do scientists use different wavelengths to explore space and climate?	▪ Identify which instruments are best suited for specific types of scientific inquiry. ▪ Formulate a research question about Earth or space phenomena.	▪ Understanding of EM spectrum and instrument capabilities ▪ Application of scientific tools to real-world problems
What makes a scientific research question worth investigating with space-based tools?	▪ Justify and present a proposal for using a satellite or telescope to address a scientific question.	▪ Argumentation and proposal writing ▪ Verbal presentation and persuasive communication

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,B), 4(A,B), 5(A,C), 6(A), 8(B,C), 11(E,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 1, Task 4 - Careers in Space Exploration

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What kinds of expertise are needed to explore space?	▪ Identify and compare key responsibilities of various NASA-related careers.	▪ Career research and interpretation
How can I map a path toward a career in space exploration or STEM?	▪ Research education, working conditions, and salary expectations for STEM roles. ▪ Describe how diverse professionals contribute to space missions.	▪ Resume and cover letter writing ▪ Understanding of interdisciplinary STEM roles
Why are ethics, collaboration and interdisciplinary skills essential in space-related careers?	▪ Create a realistic resume and cover letter tailored to a NASA-aligned career. ▪ Reflect on ethical, interdisciplinary, and collaborative elements of real-world space work.	▪ Ethical reasoning in professional settings ▪ Long-term planning and self-reflection

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C,D,E), 2(A,B,G), 3(B,C,D), 4(A,B), 5(C), 6(A,B), 7(A,B), 8(C), 10(I), 11(A,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 1, Task 5 - HAS Coding Challenge - Orbital Mechanics

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How can we model the motion of planets using code and physical systems?	▪ Describe how gravity and velocity influence planetary orbits	▪ Modeling orbital mechanics
What mathematical relationships determine the paths and speeds of orbiting bodies?	▪ Use code (block or python) to simulate orbital motion in a scaled physical model. ▪ Apply mathematical relationships such as orbital period and distance from the sun to code real-time movement.	▪ Coding in Python or Blocks ▪ Applying mathematical relationships to real-world problems
How do scientists use models and simulations to understand orbital mechanics in space?	▪ Collaborate in teams to troubleshoot, test, and refine a working Sphero-based planetary system. ▪ Explain how their model represents real-world orbital mechanics and what its limits are.	▪ Team-based problem-solving and iteration ▪ Communicating limitations of scientific models

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C), 2(A,B,G), 3(C,D), 4(B), 5(A), 6(A), 7(A,B,C,E,F), 10(C,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 2 - Coding for Remote Space Exploration

Overview: In this module, students discover how coding drives remote space exploration—from autonomous Mars rovers to intelligent orbital systems. They'll begin by translating binary code and use Scratch to design and program their own rover game. Students will then explore machine learning by training a virtual geologist to identify planetary features. The challenge continues as students take on an engineering and coding task: designing a payload hauler and programming a rover to navigate a simulated map of Mars, inspired by NASA's Perseverance and Curiosity missions. To round out the experience, students will be introduced to Python coding and explore how it supports real-world space applications.

Mission 2, Task 1 - Perseverance Parachute Code

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What is binary code, and how does it help computers and spacecraft send information?	▪ Explain how binary code represents letters and numbers in digital systems. ▪ Translate binary code to letters and vice versa using ASCII encoding.	▪ Binary to text translation ▪ ASCII encoding
How can we translate numbers into letters and messages using math?	▪ Decode the hidden message on the Perseverance rover's parachute then create and encode a custom secret message. ▪ Document decoding and encoding process in EDN. ▪ Demonstrate Mastery of binary-to-number conversion in a short quiz.	▪ Mathematical logic and number systems ▪ Use of engineering notebooks ▪ Pattern recognition and decoding

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,G), 4(A,B), 7(A,B), 8(A,B,C,D), 10(C,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 2, Task 2 - Mars Rover Game Coding

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How can we use code to create interactive games that model real-world missions?	▪ Use Scratch to design and build a simple rover-based game with interactive features based on the Perseverance and Curiosity Mars rovers.	▪ Block-based coding and logic building
What do different blocks of code do, and how do they work together to control behavior?	▪ Add core components to the game to explore the fundamentals coding using block-based programing in Scratch.	▪ Game design and interactivity
How can we use coding to simulate exploration, challenges, and decision-making on Mars?	▪ Comment the code blocks to explain how the program works. ▪ Experiment with adding additional coded features.	▪ Debugging and code commenting ▪ Creative problem-solving through code

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C,D,E), 2(A,B,G), 3(D), 4(B), 6(A,B), 7(A,B), 8(C), 10(I), 11(A,I)

HAS Online Course Curriculum Outline 2025-2026

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Mission 2, Task 3 | Exploring Mars with Machine Learning

***Temporarily removed due to timeline constraints from the 2025 government shutdown.**

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How can machines be trained to recognize patterns and make decisions like scientists do?	▪ Train, test and refine a machine learning model ▪ Categorize rock image data for AI training and understand how training data affects outcomes.	▪ Intro to machine learning concepts ▪ Data labeling and categorization
Why is the quality and diversity of data so important in machine learning?	▪ Evaluate model performance using confidence levels and accuracy comparisons. ▪ Apply a trained model to analyze rock samples, interpreting results and limitations.	▪ AI model training and refinement ▪ Critical evaluation of model performance
How can we use artificial intelligence to support planetary exploration and geology?	▪ Communicate findings in a final report and presentation. ▪ Reflect on how and why machine learning improves with iterative training	▪ Scientific communication and presentation

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,B,G), 3(B,C,D), 4(A,B), 5(A,C), 6(A), 7(B), 8(C,D), 10(I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 2, Task 4 - HAS Challenge #2 | Payload Pathfinder

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What engineering and coding challenges must be solved to traverse another planet's surface?	▪ Design and build a physical payload hauler attachment that is stable, lightweight and compatible.	▪ Mechanical design and materials testing
How can we design and control a rover system to perform science tasks in a remote, unpredictable environment?	▪ Test and refine the design to ensure it remains upright and functional on varied terrain. ▪ Communicate with a partner to navigate a remote challenge identify coding-based solutions.	▪ Block-based or Python coding for remote navigation ▪ Communication and teamwork under constraints
How do communication, design, and testing work together in remote space exploration?	▪ Write a program using block-based or Python coding to direct the Sphero on a pre-planned path ▪ Simulate the constraints of real Mars exploration, including remote operation, navigation accuracy, and payload stability.	▪ Simulation of rover task planning ▪ Troubleshooting and iterative design.

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,D,E), 2(A,B,G), 3(D), 4(A,B), 5(B.C), 6(A,B), 7(C,E,F), 8(A), 9(A), 10(C,I), 11(A,E,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 2, Task 5 - Autonomy, Asteroids and Answers: The Story of OSIRIS-Rex

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How do autonomous systems and onboard decision-making support space missions where real-time human control isn't possible?	▪ Explain how autonomous systems and onboard decision-making enabled the success of the OSIRIS-REx mission, including the challenges of remote operation in space. ▪ Summarize and interpret key scientific discoveries from the OSIRIS-REx mission,	▪ Systems Thinking ▪ Scientific Interpretation
What scientific discoveries from OSIRIS-REx help us understand asteroids and space exploration?	▪ Evaluate how the engineering design process was used to plan and execute an automated mission to a near-Earth asteroid	▪ Engineering Reasoning
▪ How can we communicate complex space mission data to the public in clear, engaging ways?	▪ Communicate complex technical information effectively by writing a press release tailored to a public audience. ▪ Compare the goals of OSIRIS-REx and its follow-up mission, and reflect on how past mission data supports future exploration.	▪ Science Communication

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 3(A), 4(A), 6(A), 7(A,B), 9(A,B,C), 10(B)

HAS Online Course Curriculum Outline 2025-2026

Mission 2, Task 6 - One Cool Thing: Remote Exploration Edition

***Temporarily removed due to timeline constraints from the 2025 government shutdown.**

Essential Questions:	*Learning Objectives:*	*Skills Developed:*
What makes a space-related technology or mission meaningful to science, society, or exploration?	▪ Identify, describe and reflect on a space-related technology or mission and communicate its significance.	▪ Science Communication
How can we describe complex innovations in ways that others can understand and appreciate?		▪ Reflective Thinking
What personal insights or questions arise when we explore space technologies and their impact?		▪ Research and Interpretation ▪ Curiosity and Exploration

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C), 2(A), 6(A)

HAS Online Course Curriculum Outline 2025-2026

Mission 3 | Design for Human Space Exploration

Summary: In this module, students dive into the challenges of designing for human survival and success beyond Earth. They'll explore how NASA transfers innovation to industry, model satellites using CAD software, evaluate and reimagine life support systems for new situations, and design astronaut tools to meet specific needs. The mission culminates in a hands-on engineering and coding challenge where students build and test a functional communications relay.

Mission 3, Task 1 - NASA Technology Transfer

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How does technology developed for space exploration benefit life on earth?	▪ Describe the process of technology transfer and diffusion, using real NASA spinoffs as examples.	▪ Research and innovation analysis
What does it take to bring a space-based innovation into real-world use?	▪ Trace the origin, applications, and diffusion path of a specific NASA-developed material or technology. ▪ Identify new, innovative applications for existing NASA technology	▪ Applying creative problem solving to real-world design challenges. ▪ Interpreting simulation outputs using Python code.
How can we use modeling and simulation to test new applications of existing technology?	▪ Use Python code to simulate a key variable or system related to their proposed innovation. ▪ Develop a written proposal that includes a product idea, a workforce/implementation analysis, and simulation-based insights.	▪ Developing written technical proposals with workforce considerations. ▪ Communicating science and engineering ideas with clarity.

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A), 4(A,B,C), 5(A,B,C), 6(A,B), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 3, Task 2 - 3D Satellite Design Challenge

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How can satellites help us answer big questions about Earth and the Universe?	▪ Identify common satellite instruments and their associated electromagnetic wavelengths. ▪ Differentiate between active, passive and in situ sensors. Describe their uses.	▪ Scientific Mission Planning ▪ Satellite systems analysis
What systems and instruments are needed to keep a satellite functional and effective in space?	▪ Analyze the key systems satellites need to operate successfully in space. ▪ Design a satellite mission to investigate a question related to climate or space science.	▪ CAD modeling and design communication ▪ Data-driven design decisions
How do design choices impact the success of a satellites mission?	▪ Create a CAD model of a satellite with realistic systems and instrumentation. ▪ Present a clear mission concept and scientific rationale through a final proposal.	▪ Oral and written technical presentation

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,D,G), 7(A,H), 8(A,C,E), 10(A,F,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 3, Task 3 - Life Support Design on the ISS

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What systems are required to keep humans alive in space and how do they work together?	▪ Identify and describe major life support systems used aboard the International Space Station, including their functions and interdependence.	▪ Systems analysis and integration
How do extreme space environments shape the design of life support systems?	▪ Analyze the environmental challenges of a hypothetical off-Earth habitat and their effects on life support. ▪ Select and justify six critical systems for a space base supporting 100 people.	▪ Engineering Design adaptation ▪ Problem-solving in constrained environments
What modifications are needed to scale life support for future space habitats?	▪ Propose realistic modifications, expansions, or innovations to existing systems to meet those needs. ▪ Document and communicate their design process clearly using written reflections and system diagrams.	▪ Technical drawing and visualization ▪ Written communication

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C,D,E), 2(A), 3(B,D), 4(A,B), 6(A,B), 8(C), 10(I), 11(I)

Mission 3, Task 4 - Astronaut Tool Design Challenge

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How do we design tools that work in extreme environments like space?	▪ Select and define a real use-case scenario for a tool needed by astronauts in space or on a planetary surface. ▪ Design a multi-functional, constraint-aware tool based on real-world requirements for size, mass, usability and microgravity operation.	▪ Engineering problem-solving under constraints ▪ CAD modeling for additive manufacturing
What makes a tool mission-ready and how do we balance function, constraints, and usability?	▪ Apply additive manufacturing principles. Justify material and part decisions. ▪ Model a design in CAD software with accurate dimensions and clear part relationships.	▪ Design thinking with human factors in mind ▪ Risk analysis and systems planning
How does additive manufacturing open new possibilities for tools in space exploration?	▪ Develop a structured engineering design report (mini-PDR) that communicated the process, design choices, risks, and future improvements. ▪ Consider human factors and ergonomic design principles in tool usability.	▪ Professional engineering Documentation

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(A,G), 4(A,B), 7(A,B), 8(A,B,C,D), 10(C,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 3, Task 5 - Deep Space Communications Relay

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How does distance affect communication in space missions and how do we model that delay?	▪ Construct and wire an electronic circuit using Arduino, distance sensor and light sensors with guidance. ▪ Calculate realistic time delays for deep-space communication based on known planetary distances.	▪ Arduino circuit design and sensor integration ▪ C++ modification and debugging
What does it take to build and code a working system that simulates deep-space communication?	▪ Modify and debug C++ code to simulate delay based on calculations. ▪ Scale and analyze the simulation results for four space destinations.	▪ Engineering calculation and data scaling ▪ Modeling real-world space communication systems
How can engineers use sensors, coding, and simulation to solve real-world aerospace challenges?	▪ Troubleshoot and refine code and hardware to achieve consistent and accurate system performance. ▪ Explain the engineering and mathematical reasoning behind the simulation setup and output.	▪ System testing, refinement, and communication ▪ Problem-solving through teamwork and collaboration

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C), 2(A,G), 3(B,D), 7(A,B,C), 8(C), 11(A,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 4 - Mission Planning for Sustained Space Exploration

Summary: In this module, students take on the role of mission planners tasked with selecting a site for humanity's next space base. Using real scientific data, they will evaluate four potential locations within our solar system and analyze environmental and engineering factors to determine a safe and practical landing site. Once a location is chosen, students will design a space base habitat then bring their concept to life using 3D CAD modeling. To extend the challenge, they will also develop automated systems for their base, incorporating emergency shutdown protocols using Arduino and coding.

Mission 4, Task 1 | Exploring the Solar System and Choosing a Space Base

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What makes a planetary body a strong candidate for sustained human exploration?	▪ Compare and contrast the geosphere, hydrosphere, and atmosphere of Mars, Titan, Europa and selected asteroids.	▪ Planetary comparison and data analysis
How do a planet or moon's atmosphere, surface and water systems affect its habitability?	▪ Evaluate planetary characteristics such as gravity, surface conditions, available resources, and environmental hazards. ▪ Analyze travel feasibility to each location, including distance, mission duration, and more.	▪ Evaluating habitability and logistical feasibility ▪ Scientific and technical writing
What scientific and engineering factors must be considered when planning human travel to another world?	▪ Integrate scientific data and logistical analysis into a comprehensive site recommendation. ▪ Develop and present a formal exploration proposal, including scientific reasoning, engineering considerations, and next steps.	▪ Critical thinking and systems-level decision making ▪ Communication of scientific reasoning and engineering constraints.

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(B,C,D,E), 2(A,B,G), 3(C,D), 4(A,B), 5(A,C), 6(A), 7(A,B,C,E), 8(B,C), 10(C,I), 11(E,I)

HAS Online Course Curriculum Outline 2025-2026

Mission 4, Task 2 - Choosing a Landing Site

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What makes a landing site safe, practical and scientifically valuable for a space base?	▪ Use NASA Trek and other data tools to explore and analyze surface features of the selected celestial body.	▪ Analyzing planetary surface features using data tools
How do geography, accessibility, and resources shape where we land on another world?	▪ Apply specific criteria to evaluate potential sites. ▪ Create annotated maps and diagrams to represent the landing site.	▪ Applying multi-factor decision criteria ▪ Creating technical visuals
How do scientists and engineers use data and tools to make critical site selection decisions?	▪ Communicate a clear recommendation in a formal proposal. ▪ Cite credible scientific sources and document decision-making processes	▪ Developing written recommendations based on scientific data ▪ Citing and documenting research

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C), 2(A,B,E,F,G), 3(B), 4A,B), 5(A,C), 8(A,C,D), 10(C,D,G,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 4, Task 3 - Space Base Habitat Design Planning

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
What systems and infrastructure are required to support human life and work in an off-Earth habitat?	▪ Design a scalable space habitat that accounts for population growth, crew makeup, and mission goals. ▪ Sketch and plan base infrastructure, including construction materials, transportation, and layout. ▪ Design sustainable life support systems for atmosphere, water, and food production.	▪ Systems-level habitat planning ▪ Engineering design for scalability ▪ Construction and infrastructure decision-making
How do we design for long-term survival, scalability, and crew well-being in extreme environments?	▪ Select and justify power systems (primary, backup, storage, etc.) ▪ Propose solutions to maintain crew mental and physical health, including layout and wellness infrastructure.	▪ Life support and power systems design ▪ Human factors engineering and well-being planning
What decisions must engineers make now to prepare for expansion, emergencies, and sustained independence from Earth?	▪ Develop a plan for routine and emergency contact with Earth. ▪ Communicate their design clearly using visual tools and technical writing.	▪ Communication systems analysis ▪ Technical communication and peer review

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 2(A,B,G), 3(B,D), 4(A), 5(A), 7(A,B,C), 8(A,C,D), 10(C,I), 11(I)

HAS Online Course Curriculum Outline 2025-2026

Mission 4, Task 4 - Space Base Concept Model

Essential Questions:	*Learning Objectives:*	*Skills Developed:*
How can we use digital tools to model and communicate complex engineering designs?	▪ Refine the habitat design based on peer feedback and critical review. ▪ Build a scaled, multi-part CAD model of a space base using industry-standard design practices.	▪ Scaled 3D CAD modeling ▪ Digital design file organization and assembly
What does it take to translate a concept into a scalable, functional 3D design?	▪ Document the design with screenshots or recordings from multiple perspectives. ▪ Present design choices clearly, including rationale for layout, systems integration, and trade-offs.	▪ Iterative design thinking ▪ Peer feedback integration
How does peer feedback and iteration improve engineering outcomes?	▪ Reflect on the engineering design process, including challenges faced, skills developed, and lessons learned. ▪ Incorporate feedback and self-assessment into a final design cycle.	▪ Technical presentation and reflection

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 1(C,D,E), 2(G), 4(B), 8(A)

HAS Online Course Curriculum Outline 2025-2026

Mission 4, Task 5 - HAS Challenge #4 | Space Base Systems Automation

Essential Questions:	***Learning Objectives:***	***Skills Developed:***
How do we design electrical systems that respond automatically to power shortages or failures?	▪ Build and wire circuits representing four electrical systems in a space habitat. ▪ Use Arduino code to simulate system response to diminishing power.	▪ Build multi-system Arduino circuits ▪ Code conditional power-down logic
What happens when multiple teams must integrate systems into one functioning base?	▪ Test and modify logic to ensure systems shut down in the correct order based on power availability. ▪ Collaborate across teams to integrate individual subsystems into a shared multipart system.	▪ Systems integration and team collaboration ▪ Troubleshooting interconnected systems
How can coding and circuits work together to manage resources in an off-Earth habitat?	▪ Troubleshoot integration challenges in both hardware (wiring) and software (code). ▪ Simulate an emergency scenario and observe system response in real time.	▪ Simulating emergency response

TEKS Alignment:

§ 127.785 Engineering Design and Problem Solving

(d) - 2(A,C,D,F,G), 3(C), 7(A,C,D,E,F), 8(A,B), 10(D), 11(C,I)