Program : Tiny Plants, Big Mission

Date: March 6, 2026 **Venue**: Lecture 1 Room, Sirindhorn Science Home, Building 18, NSTDA

Lecturer : Dr.Tatpong Tulyananda and research team

Gravitational & Space Biology, Faculty of Science, Mahidol University **Assistants**: 6 persons

Time	Activity	Note
9.00-9.30	Registration	Room : Lecture 1
9.30-10.00	Lecture Topic: Space Exploration and Space Agriculture	- Language: English - All participants
10.00-10.15	Overview of morning activities	
10.15-11.45	Activity: "Introduction to the Smallest Aquatic Plants". • Study the characteristics of the plants under stereo microscope. • Analyze chlorophyll and carotenoids contents by using spectrophotometer	- The students will be divided into 6 groups, with assistants assigned to each group.
11.45-12.00	Activity: "Human support system idea for sustainable Mars mission".	The students will be divided into 6 groups, with assistants assigned to each group.
12.00-13.00	Lunch break	
13.00-13.20	Overview of afternoon activities	
13.20-15.20	Activity: Human support system idea for sustainable Mars mission" (continued).	
15.30-16.20	Idea pitching	Judges assigned to evaluate the presentations.
16.20-16.30	Summary and Award Ceremony	All groups will be awarded

Activity 1: "Introduction to the Smallest Aquatic Plants"

The students will learn about the smallest flowering plant in the world and the fastest-growing plant, both of which have garnered global attention as potential food sources for space exploration missions. The session will begin with a general lecture on plant biology, followed by the division of students into two or three groups. They will then rotate between stations to engage in activities, switching groups once the designated time is completed. The knowledge acquired regarding plants for space exploration will provide essential background for Activity 2.

Station 1: Study the characteristics of plants under a microscope.

The students will learn how to operate and use a stereo microscope to study the characteristics of plants. They will examine features such as budding development, stomata, and the plant's structure, and compare with other plants in the same family. Additionally, students will be tasked with sketching and recording their observations.

Necessary Equipment: 2 stereo microscopes, plants, paper, and basic stationery

Duration: 30 minutes

Station 2: Analyze the levels of chlorophyll and carotenoids in water fleas by using a spectrophotometer.

The students will acquiree fundamental knowledge in the extraction of essential compounds (with pre-prepared extracts), the operation of scientific instruments, and the analysis of key compounds, such as chlorophyll and carotenoids, in water fleas. They also will engage in calculations and result analysis, skills that can be applied to other projects.

Necessary Equipment: UV-VIS spectrophotometer, cuvettes, standard laboratory glassware, and micropipettes

Duration: 90 minutes

Activity 2: "Designing a Plant Cultivation System for a Mars Mission"

Utilizing on the knowledge acquired from the lecture and morning activities, students will design a schematic for a human support system, human habitat, and space agriculture system, considering the specific requirements of the mission. The whole mission will be divided, with each group responsible for a particular component. Students may conduct additional research using computers or iPads, with support from group facilitators. They will then create a schematic or presentation in preparation for their final presentation.

The topics assigned to each group are as follows:

Group 1: Wastewater and air treatment system.

Group 2: Air recycling system.

Group 3: Plant production system.

Group 4: Animal farming system.

Group 5: To be confirmed

Group 6: To be confirmed

Duration: 90 minutes

Pitching: Each group will be allocated 10 minutes for pitching their idea, followed by a 2 minute for Q&A.

Evaluation: There will be a central panel of judges, and each group will evaluate the other groups.

Reward: All groups will be awarded the following: Best Presentation, Most Creative, Most Thorough, and Most Practical Application, ect.