INTRODUCTION
While it is true that the main objective of Astrobiology could be reduced to the search for life beyond Earth, addressing the search necessarily have to go to understand the origin of life on Earth, meet environmental factors that hinder their existence and that encouraged; know about the physical attributes of the celestial bodies that could create or sustain life, both in the solar system and outside, and a large number of other issues.


Driven by the enthusiasm of high-school, BSc, and graduate students that we have taught in the last years, through different scientific initiation programs and formal courses, we present this project in order to support students to understand the main concepts of Astrobiology through experimentation.

This project we intend to facilitate the teaching/learning of some concepts of Astrobiology, in both, formal courses (BSc and Grad-level) as in informal education and outreach.

Because of all the lectures are given in Mexico, it is very important to us that ALL the exercises and support material would be developed in (or translated to) SPANISH.

OBJECTIVES
(1) To develop, collect, and adapt, a series of laboratory practices, exercises, and demonstrations, at different levels of complexity, to be applied to graduate students in Astrophysics and Space Sciences, undergraduate students in STEM, and the general public in special outreach events and science fairs;

(2) To generate or adapt material support for the realization of such practices;

(3) To train teachers and students interested in teaching and dissemination of Astrobiology.

EXERCISES
Astronomy: We will compile exercises to be done by Astrobiology students, using equipment and infrastructure according to their level: from small telescopes for HS and BSc, to professional telescopes in case of the GRADs (our students have access to the telescopes and instrumentation of the National Astronomical Observatory at San Pedro Martir, B. C., Mexico; OAN-SPM). Laboratory exercises on Astronomy, as well as computational exercises, and use of databases, will also be included. In the case that telescopes would not be available, we suggest the use of software like those in the project CLEA (Contemporary Laboratory Experiences in Astronomy).

Biology: We also will compile exercises to be done both, on the field as in the lab. As the case in Astronomy exercises, we will try to pay attention to the level of students. In our case, for the field exercises, we have access to different ecosystems, like forest, desert, and beaches, and some sites of astrobiological interest, internationally recognized: Guerrero Negro and Laguna Figueroa (microbial mats, halophile microorganisms), El Rosario (fossils), etc. As far as possible, we will try to design field exercises independent of the region, or, if this is the case, propose alternate exercises. We will also try to keep as simple as possible the lab exercises, in order to be sure that other students can make them with minimal equipment. In some cases we will recommend to acquire lab kits of exercises like those found in Carolina.com.

Some examples of exercises for HS and BSc students (one hour exercise per week).

1. Solar System: (a) Distances from the Sun to the planets (across the campus), using a 12-in ball as the scaled Sun; (b) estimation of orbits for the Galilean system using a small telescope and smartphone cameras.

2. Stars and nebulae: (a) Spectroscopy as a tool to know chemical components of stars and nebulae (buying or making own spectroscope and observing different light sources); (b) working with professional spectroscope: data to get chemical abundances.

3. Cosmology: (a) The classical dotted balloon expansion as a simile of the Universe expansion; (b) CLEA software: The Hubble Relation, The Large Scale Structure of the Universe.

4. DNA: (a) Carolina.com: DNA Necktie Classroom Kit; (b) NASA-CERES Project, Montana State University: Designer Genes for a Designer World.


7. Extremophiles: (a) Observing tardigrades (water bears), Artemia (sea monkeys), etc, by microscope and taking photo and video with smartphones, making measurements and behavior observations; (b) Carolina.com: Life in an Extreme Environment Kit.

8. Habitable Zones: (a) Calculation of habitable zones for different stars; (b) NASA-CERES-MUS: Defining the HZ.

9. Comets, asteroids, meteorites: (a) Hands-on experience with a real meteorite collection; (b) Observing asteroids with small telescopes (bining images) and making some calculations (c) CLEA software: Astrometry of Asteroids.

10. Moon: (a) Observing and identifying features, small telescope +Google Moon; (b) Estimation of the height of lunar mountains using a small telescope and smartphone camera (in combination with CLEA software).

11. Explorators: (a) Measuring light curves in the lab; (b) playing with Kepler mission data and tables.

12. Venus and Mars: (a) Observing the phases of Venus; (b) NASA-CERES-MUS: The First Manned Mission to Mars.

13. SETI: (a) Running Monte-Carlo simulations (Rodrigo Ramirez’s Mile clans, UNAM); (b) NASA-CERES-MUS: Estimating the Number of Civilizations in the Milky Way Galaxy. (c) A hypothetical alien interview.

FINAL COMMENTS
The aims of this project is to produce educational material and lab manuals. The products will appear in the website as they will be generated, being careful to respect Copyright agreements. Procedures will be implemented in the different courses, workshops, and activities in order to probe their effectiveness, and they would be modified in case they need to improve.

We will thank any feedback and suggestions about techniques, exercises or any other procedure capable to be adapted to this project.

REFERENCES

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