宇宙から
届く不思議を
伝えよう
Our inspiration with John Ellis!
... and we start!!!
Curriculum

Brazil/Dominican Republic/Japan: University

Bulgaria: VII to XII years of education

Ukraine: 3 year of High School
Classroom connections

- Universe Origin
- Thermodynamics
- Inflation of the Universe, Red Shift and telescopes
- Optics
- Kepler’s Law
- Cosmic Rays
- Star and galaxy evolution - Black Holes
- Atoms fusion
- Gravitational Force
- Photoelectric effect
- Standard model
- Detection Technology
- Nuclear Physics
- Special and General Relativity
- Galilean Relativity
- Inflation of the Universe, Red Shift and telescopes
- Optical telescopes
Teacher main goals and tasks

• provide general and specialized system knowledge of astronomy and astrophysics;

• to form skills of scientifically grounded thinking, logical and consistent expression of own thoughts;

• to develop communication abilities;

• to develop the ability to independently work with information sources, to systematize, generalize the information obtained and to use it.
Main concepts
what students should to know

- general information of galactic astronomy;
- elements of cosmology;
- cosmological paradoxes and principles;
- models of the universe;
- Fundamentals of astrophotometry and spectroscopy;
- laws of equilibrium radiation;

- basic information about the solar system;
- on the physical nature of the stars and the main stages of their evolution;
- the main sources of star energy;
- physical content of the Hertzsprung-Russell chart.
- to solve the exercises on the red shift and the law of Hubble.
Education
before and now

Medicine
before and now
Inquiry Learning Cycle

1. Orientation
2. Question
3. Exploration
4. Data interpretation
5. Conclusion
6. Hypothesis
7. Experimentation
8. Communication
9. Reflection
10. Discussion

11. Conclusion
Cosmology for students

Universe is
Beautiful! , interesting!

Unfamiliar, difficult to understand ...

Visible things attract students and help their understanding.
Difficulties and Challenges

- Very theoretical
- Beyond human scales dimensions
- Don’t see the relation between technology and society
- Lack of understanding of concepts from the teachers.
- Not many basic observations of the night and daytime sky

- From Models developed by Copernicus, Kepler, Galileo, and Newton to the present image of a universe formed by billions of galaxies
- Simple numerical estimations of basic concepts, albeit at an informative level of physics forces and movements, gravitation, optics, waves (Doppler effect), electromagnetic spectrum, nuclear physics, relativity, etc.
- Discussions with the teacher: possible solutions and findings instead of just accepting them because of the authority of the teacher or because they are in the textbook, in order to get a better understanding of the concept.
Relation between cosmology and society (school)

Cosmology

- observation of universe
- tool
- deepening the understanding of world

Technology

- benefit

Society

SG7/ITW2017
material and resources

For class activities, students’ programme ex)IPPOG

Application ex) Copernican orrery

General information ex)nasa

Participation of mission and experiment ex)AMS

Online lab ex) cromoscope

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Do you want to go to the moon!