Universidad del Desarrollo
Universidad de Excelencia

Syllabus
Introduction to Astronomy

A. General Information

1. Academic Unit	OFFICE OF THE UNDERGRADUATE VICE-PRESIDENT					
2. Program	SCIENCE, TECNOLOGY AND INNOVATION TRACK					
3. Code	TRC174					
4. Location in the curriculum	A.A. degree					
5. Credits	8					
6. Type of course	Mandatory		Elective	X	Optional	
7. Duration	Bimonthly		Semi-annual	X	Annual	
8. Modules per week	Theoretical	2	Practical		T.A.	
9. Class hours	Classes	68	Teaching Assistance			
10. Prerequisites	None					

B. Contribution to the Graduate's Profile

Taking into consideration the changes in the work environment, which have to do with the global environment, diversity and interdisciplinary perspective, our University has designed an Educational Project that providing a strong disciplinary formation in coherence with the needs of the work world, It helps the students to develop new skills and knowledge that allows them to successfully face the professional scenario that awaits them at the end of their undergraduate training. Within this context the courses arise with the clues and the topics that aim to contribute, through the extradisciplinary training, towards the most enriching learning experiences that preparethem for the changing work world.

The Introduction to Astronomy course is part of the Track “Science, technology and innovation”, which gives the students the basic concepts of this relevant science, review the latest discoveries and how, thanks to the natural advantages, Chile is one of the key countries for the development of this science. The students will understand the celestial objects and their phenomena. They will also develop critical thinking and communication skills.

C. General Competencies and Learning Outcomes from the Course

Generic Competencies	**General Learning Outcomes**
Communication	- Explains basic concepts of Astronomy; including the nature of light, the light-matter interaction, telescopes and instruments, the movement of the Earth and the Sun in our galaxy and the origin of the seasons of the year, among others, through questionnaires and oral presentations. - Defines, from the scientific point of view, our location in the Universe and in time, considering the acquired knowledge. - Explains the importance of Chile as the astronomy world capital to its peers and its others. - Critically analyzes topics ofpseudoscience, in debates and discussions.

D. Units, Content and Learning Outcomes

Units and Content	Competency	Learning Outcomes
Unit I: Introduction - Universe scales - Constellations - Celestial sphere - Coordinates systems	*Critical thinking*	Explains basic concepts of Astronomy, through the development of questionnaires. Identifies the positions of astronomical objects through their astronomical coordinates. Observes the night sky by finding the objects through their astronomical coordinates, through projected images.
Unit II: Movements of the Solar system - Seasons - Lunar phases - Eclipses - Kepler laws - Un. gravitational law - Tidal forces - Experiment: Does the scale lie?	*Critical thinking*	Explains basic concepts of astronomy related to the dynamics of celestialbodies to their peers. Applies the scientific method in the development of an experiment on gravity exposing the results to their peers and teacher.

Unit III: Light and matter - Light interactions - Astronomical instruments - Experiment: Spectrograph - New projects: ALMA, LSST, etc. - Light pollution	*Critical thinking* Communication	Explains basic concepts of astronomy related to the properties of light in guided discussions. Applies the scientific methodin the development of an experiment on light andmatter, exposing their results to their peers and teacher. Explains the importance of Chile as the World capital of Astronomy and analyzes the quality oflight in cities for the good of society, in guided discussions.
Unit IV: The Solar system - S.S. planets - Asteroids and comets - Extrasolar planets - Life in other planets	*Critical thinking*	Explains basic concepts of astronomy related to planets, asteroids and comets,in guide ddiscussions and preparingthe final videos.
Unit V: The energy of the Sun - Nuclear reactions - Solar thermostat and variable stars - The origin of the chemical elements	*Critical thinking*	Explains basic concepts of Astronomy related to the stars, the origin of their energy and the chemical elements that are the building blocks of the objects we know.
Unit VI: Life of the stars - Birth of stars - Stars evolution - Dead of stars - Black holes, white dwarfs and other remnants.	*Critical thinking*	Explains basic concepts of astronomy related to the birth, life and death of thestars, in active-participatory activities.

Unit VII: The galaxies - The Milky Way - Morphology and clarification - Galaxy evolution - Large scale structure	*Critical thinking*	Explains basic concepts of Astronomy related to the properties of galaxies and in particular our own galaxy, in active-participatory activities.
Unit VIII: Cosmology - The Big-Bang, - Dark matter and dark energy - New theories about Universe evolution	*Critical thinking* Communication	Puts in correct perspective, from the scientific point of view, our location in the Universe and in time, through guided discussions. Explains basic concepts of Astronomy related to the origin and evolution of the universe, in active- participatory activities. Analyzes pseudoscientific topics related to alternative, non-scientific theories about the evolution of the Universe, comparing various publications about it.

E. Teaching Methods

- Challenge-based learning: Students will have to read texts and develop ways to explain the learned concepts to their classmates based on the texts and the topics introduced in class. They will also make a video.
- Experiential learning: Students will have to perform some experiments and present their results.

F. Evaluation

Students will be evaluated with tests, in the middle and at the end of the course. They will carry out experiments in group. At the same time, a free-format video on a relevant topic must be done in group.

Assistance Requirement:

"The course and/or activity include a mandatory attendance requirement, which implies that students who fail to meet this requirement will not be eligible to take the Final Exam for the subject, as stated in the Academic Regulations for Regular Students. The number of allowable absences will be specified in the respective calendars of each course and/or academic activity, and this information will be provided at the beginning of the school period for each of them."

G. Learning Resources

✓ *Bibliography:*

- The Cosmic Perspective; Bennett, Donahue, Schneider, Voit; ed. Pearson; 2007
- Astronomía Contemporánea; Maza; ed. B; 2009
- Universe; Freedman, ed Freeman; 2005
- Hijos de las Estrellas; Ruiz; ed. B; 2008
- Con ojos de Gigantes; Barrientos, López; ed. B; 2008

✓ *Web-based:*

http://exoplanets.org/
https://www.nasa.gov/audience/foreducators/index.html
http://stellarium.org/