TEACHING GUIDE ON

ASTROBIOLOGY & EXTRASOLAR PLANETS

MASTER MODULE	SEMESTER	CREDITS	COURSE TYPE
Particle and Astroparticle physics	2	6	Optional

PROFESSOR(S)	CONTACT DETAILS
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	TUTORIALS TIMETABLE
	http://www.ugr.es/~fteorica/Docencia/2019-2020/Tutorias.php

MASTER DEGREE
University Master in Physics: Radiations, Nanotechnology, Particles and Astrophysics, University of Granada
TEACHING DATES AND TIMES
M-T-W 17:00-18:00 h
PRE-REQUISITES FOR REGISTRATION
Degree in Physics, Mathematics, Chemistry or Engineering recommended
BRIEF CONTENTS DESCRIPTION

Present-day Astrophysics and Cosmology are based on the development of cutting-edge astronomical instruments - which provide observations with great precision - and numerical simulations (models) with which to compare these observations. We aim to provide students with a global, up-to-date understanding of the formation of stars and planets and the techniques for detecting extrasolar planets. We will also demonstrate how the study of the development and evolution of life on Earth can help us infer the existence of life on extrasolar planets.

PROGRAM

- 1. Astrobiology and exobiology: Introduction. What is life on Earth? Limiting conditions for habitability. Development and evolution of life on Earth. Speculation about the origin of life.

- 2. Cosmochemistry: Molecular clouds in the interstellar medium. Chirality. Origin of chemical elements in the solar system. Isotopic anomalies and implications for life. Cosmochemistry in comets and asteroids. Asteroid impacts.

- 3**. Planetary Formation**: Formation of stars. Proto-planetary disks. Classes of planets and formation scenarios. Nucleation and coalescence of planetesimals. Dependence on the position in the proto-planetary disk. Migration.

- **4. Extrasolar Planets I:** Indirect detection. Direct detection and image. Inventory of planets and features. Habitable zones. Evolution of habitable zones. Habitable zones in the Galaxy.

- **5. Astrobiology in the Solar System:** Climatic evolution of the planets and their atmospheres. Basic radiative transfer. Atmospheric spectra. Remote sounding. Search for life on Mars, Venus, Titan, and Enceladus Europe. Current missions.

- **6. Extrasolar Planets II:** Emission and reflection spectra of planets: habitability. Appropriate exploration techniques. Atmospheric and geological biomarkers. The solar system planets as seen from space. Atmospheres and spectra of exoplanets. Current observational projects and future missions.

BIBLIOGRAPHY

- An Introduction to Astrobiology. I. Gilmour & M.A. Sephton. Cambridge Univ. Press. 2004

- Transit Exoplanets. C. A. Haswell. Cambridge Univ. Press 2010

- Extrasolar Planets & Astrobiology. C.A. Scharf.University Science Books 2009

- Planets and Life. Eds. Sullivan & Baross, CUP, 2007

- Encyclopedia of the Solar System, 2nd Ed. McFadden et al., AP, 2007

- - Planet Mars: Story of Another World. Forget et al. Springer, 2007