



# Bachelor in Physics (Academic Year 2025-26)

<b>Astrophysics</b>		<b>Code</b>	800507	<b>year</b>	3rd	<b>Sem.</b>	1º
<b>Module</b>	Fundamental Physics	<b>Topic</b>	General Astrophysics	<b>character</b>	Optional		

	<b>Total</b>	<b>Theory</b>	<b>Exercises</b>
<b>ECTS credits:</b>	6	4	2
<b>Semester hours</b>	45	30	15

<b>Learning Objectives (according to the Degree's Verification Document)</b>
<ul style="list-style-type: none"> <li>• Know the basic techniques of astronomical observation.</li> <li>• Be able to interpret the basic observational parameters.</li> <li>• Understand the different scales and structures in the Universe</li> <li>• Know the main physical properties of stars, galaxies, the interstellar medium, star clusters and galaxies, etc.</li> <li>• Be able to understand the foundations of the standard cosmological model and the observational evidence that supports it.</li> </ul>
<b>Brief description of contents</b>
Introduction to Astrophysics (astronomical observation), stars (the Sun, parameters, stellar evolution), planets (of the Solar System, extrasolar), galaxies and cosmology (cosmology, structure, external galaxies, the Milky Way)
<b>Prerequisites</b>
Knowledge of General Physics.

<b>Coordinator</b>	Patricia Sánchez Blázquez			<b>Department:</b>	FTA
	<b>Office:</b>	00.321.0	<b>e-mail</b>	patsan17@ucm.es	

<b>Theory/Problems – Schedule and Teaching Staff</b>								
<b>Group</b>	<b>Lecture Room</b>	<b>Day</b>	<b>Time</b>	<b>Professor</b>	<b>Period/ Dates</b>	<b>Hours</b>	<b>T/E</b>	<b>Dept.</b>
<b>B</b>	7	Mo, F	13:30 – 15:00	O'Sullivan, Shane Patrick	Full term	45	T/P	FTA

Office hours				
Group	Professor	Schedule	E-mail	Location
B	O'Sullivan, Shane Patrick	Mo, Fr: 15:30-17:30	shanepos@ucm.es	04.224.0

\* 3 h tutorials during the working week through email, virtual campus, etc.

SYLLABUS
<p><b>I. Introduction</b></p> <p>1. Astronomical Observation</p> <p><b>II. Stars</b></p> <p>2. Stellar Parameters</p> <p>3. The Sun</p> <p>4. Star Formation</p> <p>5. Stellar Evolution</p> <p>6. Final Stages of Stars</p> <p><b>III. Planets</b></p> <p>7. Solar System</p> <p>8. Exoplanets</p> <p><b>IV. Galaxies and Cosmology</b></p> <p>9. Introduction to Cosmology</p> <p>10. Large-Scale Structure of the Universe</p> <p>11. The Nature of Galaxies</p> <p>12. Galaxy Evolution</p> <p>13. Active Galaxies</p> <p>14. The Milky Way</p>

Bibliography
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- “*Universe*”, by R. A. Freedman, R.M. Geller y W.J. Kauffmann III, Ed. W.H. Freeman & Co., 2013.
- “An Introduction to modern astrophysics”, by B. W. Carroll y D. A. Ostlie, Ed. Addison- Wesley, 2007.
- “Fundamental Astronomy”, by H. Karttunen et al., Ed. Springer, 2007.

Online Resources
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Online resources will be provided through the virtual campus.

Methodology
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Teaching is delivered through lectures focusing on the theoretical aspects of the field, and resolution of quantitative exercises.

Evaluation criteria
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Exams	Weight:	70%
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A written exam with theoretical questions and quantitative exercises about the material covered in the

course.		
<b>Other activities</b>	<b>Weight:</b>	30%
Resolution of questionnaires and exercises through the virtual campus and/or in-class exercises.		
<b>Final mark</b>		
<p>The course grade, NFinal, will be determined according to the following plan:</p> <ul style="list-style-type: none"> <li>• <math>N_{Final} = 0.7 \cdot NE + 0.3 \cdot NOA</math> if <math>4 \leq NE \leq N_{Final}</math></li> <li>• <math>N_{Final} = NE</math> if the above condition does not apply</li> </ul> <p>The same NOA will be used in all the calls of the academic year.</p>		