

# Universo Complutense: a blog for astronomy and astrophysics students.

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## Abstract

Astronomy and astrophysics students in the last degree and Master courses often encounter difficulties in dealing with astronomy specific software that hampers their progress during the practical lessons. In an effort to ease their way and provide complementary resources, we started a teaching innovation project at Universidad Complutense de Madrid that consisted on a wordpress blog and an associated YouTube channel with video-tutorials. Based on our own teaching experience at all academic levels, we identified what we considered the main weak points of the students that would benefit from supplementary material and published a series of entries and videos focused on the use of UNIX systems, Python packages, and specific astrophysical software and databases. The characteristic feature of this material is that it is available completely in Spanish.

## 1 Introduction

At Universidad Complutense de Madrid, we have a large number of students interested in specialising in astronomy and astrophysics. Students in the Physics faculty are offered a series of subjects to introduce them into astrophysics at the last courses of their degree, while those in the Mathematics faculty are taught position astronomy and celestial mechanics at a very high level, and many of these students do an End-Of-Degree project in astrophysics and later choose to study the Astrophysics Master at the Physics faculty. As former students of that Master programme and teachers involved in the courses, we had first-hand information on the main weak points of the students that made their introduction into practical astrophysics difficult. Although it depended strongly on their background, we found that students commonly struggled working with UNIX-based systems (in many cases without a supporting

graphical interface) and their programming skills were at a level much lower than desired. Therefore, in 2019 we applied for a teaching innovation project at our university entitled ‘Soft skills for degree and master students’ with the objective of elaborating additional supporting material for these students. In that framework, during the academic year 2019/2020 we created a Wordpress blog, [Universo Complutense](#), and an associated [YouTube channel](#) where we uploaded a series of video-tutorials as supporting material for the written entries. In the following sections we present an overview of the contents of both sites (Secs. 2 and 3) and an overview of the envisioned future content of the blog (Sec. 4).

## 2 Wordpress blog

The Wordpress blog can be accessed via [this link](#). In a first stage, we elaborated a list of potential contents for the blog classified into four blocks:

- UNIX systems. How to use the terminal for remote connections and file edition (vi).
- Python. Basic usage of the commonly-used packages pandas and numpy, graphical representation with matplotlib, and the specific package astropy.
- Databases: VizieR, MAST, ESA Archive, SIMBAD, and Virtual Observatory tools such as TopCat.
- Specific software: Aladin Sky Atlas, EsaSky, Wobble, iSpec.

We started covering the contents of the first two blocks, which were the most technical ones and the most needed by our students for their projects. First, we introduced UNIX at a very low level and provided a virtual machine with a basic Lubuntu installation that could be run on Windows systems, which is the most popular operating system. On subsequent publications, we explained what a terminal was and the mostly used shortcuts for creating files and folders, renaming and moving them, and updating the software, and devoted one entry to remote connections and basic file edition using ‘vi’. Once this part was finished, we moved towards more specific written tutorials from the last two blocks. We provided a page with a list of useful links and then we moved to Python (how to perform a basic installation with and without anaconda). With that, we finished the introduction and immersed ourselves in the main contents of the blog focusing on specific software and working with real astrophysical data. At the time of writing this contribution, we have published more than ten entries classified into different categories to help the readers to find the desired content, as is shown in Fig. 1. Apart from the direct feedback received from our students, it is also possible for any reader to leave their comments on the blog, but up to now we have not received any suggestions for new content.

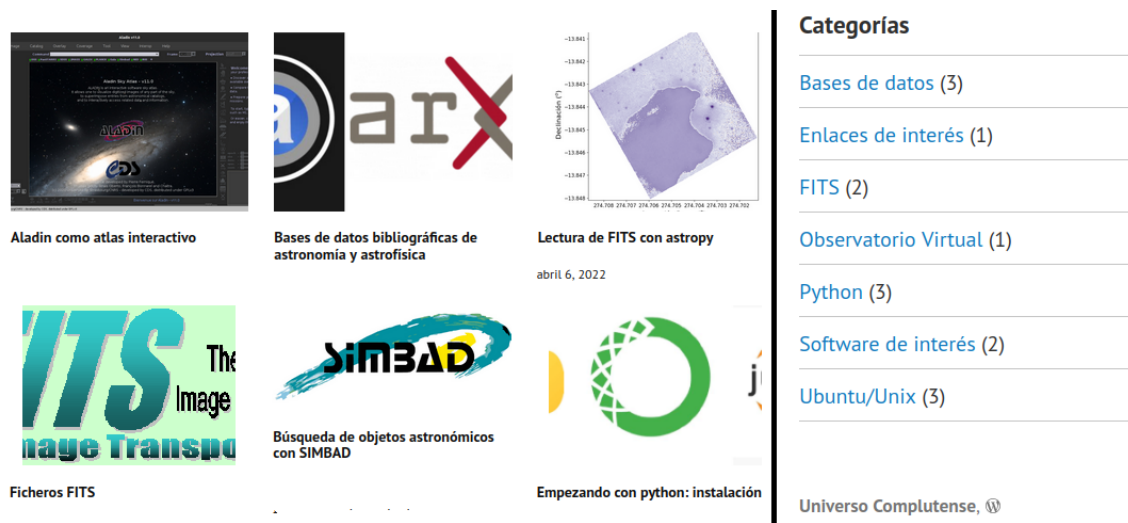


Figure 1: Preview of some entries of the blog (left) and the categories available on January 3, 2023 (right).

### 3 YouTube channel

The YouTube channel is also public and available through [this link](#). On January 3, 2023, it counts with 19 subscribers and 8 videos (Fig. 2). There is not a one-to-one correspondence between blog entries and videos, since sometimes the written content in wordpress was self-consistent and self-explanatory, while other times we decided to provide supporting videos showing different functionalities (for instance, the two versions of Aladin, Desktop and Lite). As a general rule, we have opted for a format of short (less than 15 minutes) videos that are easy to follow and reproduce, where we explore either the general features of the software or one very specific example.

### 4 Future steps

So far, we have covered roughly three quarters of the contents we envisioned when we proposed the teaching innovation project, but we have several ideas to continue. Among them, we can list: a tutorial on the use of EsaSky, specific entries for an advanced use of SIMBAD and other CDS tools such as the cross-match catalogue service, basic use of DS9 for FITS preview and aperture photometry, and more Python-related entries for sophisticated plots with matplotlib or line fitting with specutils. Besides, since some of us are also involved in teaching space science to students of Mathematics Engineering, we are also planning to expand our horizons with new content focused on positioning, signal and image processing, that might catch the interest of engineering students in other fields outside astronomy, making Universo Complutense a fundamental tool for unifying space astronomy and astrophysics for the Spanish-speaker community.

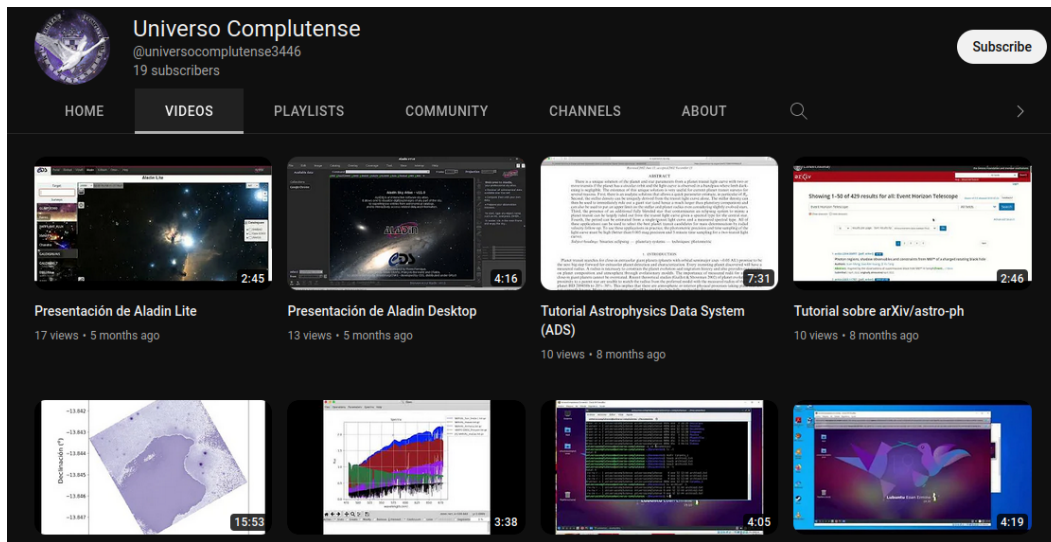


Figure 2: Snapshot of the videos available on the YouTube channel on January 3, 2023.

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