Lecture Tutorial: Using “Astronomy Picture of the Day” to learn about the life cycle of stars

For this exercise, you will need an ipad or computer and access to the internet. We will be using the website “Astronomy Picture of the Day” (APOD, for short) to learn more about the life cycle of stars.

1. Use your internet browser to go to http://apod.nasa.gov/. APOD features a new astronomical image each day, accompanied by a caption, and you can search for and view all past APOD images. See the “Search” link at the bottom left of the page.

2. First, let’s look at the earliest stages of a star’s life. Use the search feature to search for the term “stellar nursery”. Choose one of the images that results from this search.

   What does the image show?

   Are the objects in the image located in the Milky Way galaxy, or outside? If outside, what galaxy are they located in? (Note that usually the caption will say if it’s located in another galaxy.)

   What colors are the objects? What do the colors mean?

   Do you see any unusual structures? What causes them?

   Write down something interesting you learned about stellar nurseries from this image and caption to share with the class.

3. Now let’s look at a main sequence star. Search for the term “sun”. Choose one of the close-up images of the sun (not a picture of a sunset viewed from the Earth)
Does the image look the same as the sun usually looks to you? Why or why not?

What telescope/instrument/spacecraft obtained this image? How does that affect the way this image looks?

What colors does the sun have in this image? What do the colors mean?

Do you see any unusual structures? What causes them?

Write down something interesting you learned about the sun from this image and caption to share with the class.

4. Many stars come in pairs or multiples! Let’s look at a system that has both “main sequence” stars and more evolved “red giant” stars. Search for “Albireo”. Choose the image called “Albireo: A bright and beautiful double”.

How many stars do you see?

What is the meaning of the term “binary system”?
According to the caption, how many stars are actually in this system? Why can’t we see them all in this photo?

The fainter star is on the “main sequence”, like the Sun, meaning it is burning hydrogen to create fuel. Does this star look like the Sun? If not, how is it different?

The brighter star is a “red giant” star. Does this star look like the Sun? If not, how is it different?

Why is this image not as detailed as the images of the sun from the last part of this activity?

If we could see Albireo from very nearby, in what way(s) would it look different from the Sun?

5. Let’s look at another evolved star. Search for “Aldebaran”, also a red giant star. You’ll see lots of images of the night sky. Choose one or a few of these, and see if you can locate Aldebaran in the images, by using the descriptions in the caption.

What color is Aldebaran?

Which star in the Albireo system is it closer to in color — the brighter or the fainter?
6. Now let’s look at the latest stages of a low mass star’s life. Search for the term “planetary nebula”. Choose one of the images to answer these questions.

   What does the planetary nebula look like? Draw a diagram of the planetary nebula and label the features you see.

   What causes the structures you see in the planetary nebula?

   What type of star is at the center of the planetary nebula?

   What colors do you see in the planetary nebula? What do they mean?

   Write down something interesting you learned about planetary nebulae from this image and caption to share with the class.

7. Now let’s look at the latest stages of a high mass star’s life. Search for the term “supernova remnant”.

   Scan through the images, and look at several of them. What kinds of structures do you see? Do they all look the same?

   Choose two supernova remnants that look different and write down their names here. Describe
their similarities and differences.

Do the captions give you any hints as to why these two systems might be different? If not, why do you think the structures might be different?

What telescopes were used to obtain these images?

Write down something interesting you learned about supernova remnants from this image and caption to share with the class.

8. Now let’s look at the latest stages of the most massive stars. Search for the term “black hole”. Choose an image that interests you.

Is this image an actual photo, or is it a computer simulation?

What does this image have to do with black holes?

Write down something interesting you learned about black holes from this image and caption to share with the class.
9. Using the images you saw, and what you learned from this activity, draw and label a diagram showing the life cycle of a star.