

PHS-152 – Astronomy
Observing Lab 2

Do this lab during October or early November

In these labs, you will take your computer outside at night and use Stellarium (or another app) to learn the constellations and the night sky. It is actually pretty rewarding to be able to point out constellations to your friends. They will think you are cool and will be super jealous of your amazing knowledge.

The other apps that I would recommend are:

- SkyWeek - tells you what cool stuff is up in the sky this week
- Sky portal from Celestron - probably the best of the apps, in my opinion. Although it does not do point and shoot like Skymap.
- Skymap - point and shoot app to tell you what you are looking at
- Heavens Above - tells you what cool stuff is up in the sky tonight
- Nightshift

Summary:

This is our first observation lab for you to practice using Stellarium and translating that to what you can see in the sky. I hope you enjoy this (and that we have a few nights of clear skies)!

Objective:

You should be able to recognize some of the major constellations in the sky over the Quad Cities and compare them to what Stellarium says you should see.

Helpful observing tips:

- Get somewhere as dark as possible - your backyard will work fine but, if you can, try going to a park somewhere away from bright city lights. You will also need to be able to see the sky - so try to stay away from tall trees or other tall obstructions. Obviously, it can't be cloudy out and you have to go out after the sun sets. And, of course, astronomy is most fun with friends or family! So, get a crew together!
- Gather some warm clothing (it is always colder than you think it will be), bug spray, and a blanket or something to sit on. Spend about 5 minutes looking away from lights and up into the sky. It will take about that long for your eyes to adapt to the darkness. Do not attempt to do the rest of this exercise if your eyes have not adapted! The visibility of anything in the sky will suffer. Also, remember not to look at your cell phone or white light flashlights - these ruin your night eyes. Remember, Stellarium can be set to Night Mode!
- You will need to be able to visualize what the constellation looks like. This will be easiest if you turn on the constellation outlines on Stellarium. Take note of the compass direction along the horizon (and figure out your cardinal directions associated with your spot - which direction is East, for example). Pay attention to how high in angle the constellation should be found.

Assignment to turn in:

So far, we have looked at the Stellarium program, and you have taken a stroll through the various tools that the program has to offer. Now, I would like to put that knowledge to use. I will give you a set targets to look for.

1. You should look them up on Stellarium and then actually go and find them in the sky (see helpful observing tips above).
2. Sketch what you see on paper
 - a. You can use a notebook or journal - but I wouldn't spend the money on one unless this amateur astronomy thing is something you are going to keep doing to eventually fill up the notebook - you can just use a sheet of paper. You can use graph paper so that you have an easy grid to draw on - ask me if you want some graph paper.
 - b. Try to plot the stars in your sketch fairly accurately. Include some other constellations around the target, so your sketch will enable you to find that constellation again. Use bigger dots for brighter stars. Next to your sketch, sketch what Stellarium SAYS you should see! Are there any differences?
 - c. Label each sketch with the date, time, place of observation, cardinal point (compass) direction(s), weather conditions and any other relevant information (e.g. brightness or magnitude of brightest star; ease to find) or handy reminders ("over the top of the library") or other comments ("constellation is very small," "no bright star so constellation is hard to find,"
3. Research each of the constellations on Google and find the most interesting objects (such as important stars, galaxies, nebulae, globular clusters). Also research the cultural history and/or mythology associated with the constellations. This only needs to be a very brief overview - only a few sentences or a paragraph in your lab report. Save the super in depth research on these constellations for the Constellation Reports.
4. Answer any other questions or prompts that you see in the instructions below.

I will take this assignment in whatever format is easiest for you. For example, you can hand in your drawings on paper and submit typed answers to the various questions. Or you can hand write/draw everything. Whatever makes it easiest for you works for me.

1. Set the location to Bettendorf and set the date and time October 15th, 10:30 pm (remember military time). Look South and Southwest. What two planets do you see?
2. What Zodiac constellations are the two planets in? What are these two Zodiac pictures (a dog, a bear, a horse...)? Why are planets always in Zodiac constellations?
3. Write in your log what date and time you are observing the planets (doesn't necessarily have to be October 15th. Use Stellarium to figure out where they will be on your observing night and check them out. Are they still in the Zodiac constellations you found on October 15th or are they somewhere else? If so, where?
4. Try to find all of the stars in the two Zodiac constellations in the real sky - this can be pretty difficult depending on how dark your observing site is. Don't worry if you can only see a few of the stars.
5. West of Saturn, you should see the Aquila, Cygnus, Lyra, Big and Little Dippers, and Draco constellations from the last lab. Nothing to write down for your lab report here, just pointing these constellations out.
6. Finally, let's find three more fairly prominent constellations.
 - a. In the Northeast, you'll find the pretty well known constellation called Cassiopeia. It is easy to find because it looks like a "W."
 - b. Close to Cassiopeia is Pegasus, an animal shape that should be familiar to older Disney cartoon fans. The legs and head of Pegasus can be difficult to locate but you should be able to pick out the prominent square body.
 - c. Now head back to the bright star Vega in Lyra and just Northwest (and just below Draco), you should find the other famous figure from that well-known Disney film, Hercules.
 - i. Interesting note that in actual mythology, Hercules and Pegasus have no connection. They didn't go on any adventures together and are not part

of any story together. Disney put them together for the movie. You can tell astronomically that they aren't related by any story because they aren't close together in the sky. Constellations that are close together (as in next to each other) are usually in the same mythological stories.

- d. In Stellarium, Zoom in on the three prominent deep sky objects in Pegasus and Hercules. Research these objects on Google and describe what they are. If you have a really nice pair of binoculars or a telescope, you should be able to see them in real life.
 - i. Pegasus
 1. Pegasus cluster
 - ii. Hercules
 1. Messier 92
 2. Great Star Cluster
 - iii. Capricorn
 1. Messier 30
7. Just like the last lab, make some instructions for yourself to help you to find all of these constellations again. Do NOT base anything off of the planets, because the planets move. Base it on very prominent stars or easy to locate constellations (my recommendation, Casseopeia or the Big Dipper). And don't forget about Step 3 in the **assignment to turn in.**
- a. For this lab, we looked at Pisces, Capricorn, Pegasus, and Hercules.
 - b. On a different night, take a friend, sibling, or parent out and use your written methods to help them find these constellations. Have them sign your log.

STELLARIUM KEYPAD CONTROLS

Download latest software from: <http://www.stellarium.org>

Great user guide:

http://www.stellarium.org/wiki/index.php/Stellarium_User_Guide

4 Directions: left arrow left, right arrow right, up arrow goes up

image, down arrow down image, click and drag up or down (or left and right) moves the horizon.

Most important:

Funct1: help F11: fullscreen Control-q: quit (Mac: Command-Q)

Zoom in/out: Page Up/down (or control arrows (WIN) or Command arrows (Mac))

Function keys:

1: Help (shows these shortcuts)

2: Configuration (select "save settings" to save for next time!)

3: Find object

4: View options

5: Set date/time (yes, you can go way in the past or future)

6: Set location (tick "save as default" after setting location)

11: Toggles fullscreen

Key shortcuts: (Some are version or platform dependent)

7: Stop time (default is real time)

8: Return to computer time

Left click: select star

Right click: Clear selection

J: run time backwards (hit again = backwards faster)

K: forward at diurnal rate

L: forward faster

=: forward by a solar day (keep pressed to step through days)

option=: advance one sidereal day

-: backward by a solar day

option-: back one sidereal day

[: backward by a week

]: forward by a week

/: auto-zoom into object

\: return to setting (unzoom)

(Note setting in config: unzoom back to start look direction)

A: Atmosphere

B: Constellation boundaries

C: Constellation outline

D: Star labels

E: Equatorial Grid

F: Fog

G: Ground

N: Nebula labels

P: Planet Labels

Q: Cardinal points

R: Constellation artwork

S: Star labels

T: Track Object

V: Constellation Labels

Z: Azimuthal grid

SPACE: center (MUST CENTER BEFORE ZOOMING IN TO THE OBJECT)

,: Ecliptic line

.: Equator line

Scripts: varies with version