Astronomy 101 Fall 2010 Project: The Observations

For this project, you will make observations of the Moon to determine its synodic and sidereal periods. Synodic refers to a time that is measured relative to the sun. The synodic period of the Moon is the time it takes for the Moon to go from new phase to the next new phase (or full to full, etc.). Since the Earth is orbiting the sun, this synodic period of the Moon is not the same as the time it takes for the Moon to orbit the Earth with respect to the background stars, which is called the sidereal period. The difference between the Moon's synodic and sidereal periods is almost two full days.

**Purpose:** You will be taking some simple measurements of the position and phase of the Moon over a six-week period. From these observations, you will determine the synodic and sidereal periods of the Moon and summarize your findings. In this part of the project, you will collect data by observing the Moon over several weeks. You will later analyze the data in the preliminary and final analysis sections. You will then write a project report to summarize your findings.

**Procedure:** You will make observations of the Moon each week for the next six weeks. Ideally, make an observation of the Moon every day. The only stipulation is that observations must be at least 16 hours apart. You'll find that the more observations you can get in, the better your results will be once you reach the two analysis sections of the project.

Be sure to print out a copy of the data sheet to keep track of your observations. The data sheet can be found [here](#).

In class, we learned the different phases of the Moon. Of particular use here is knowledge about the rise and set times for the major phases of the Moon. You should plan out your observations. After all, the Moon is not always up in the sky at 7pm. On some days, you will be able to observe the Moon during the day. On some days, the Moon will only be up at night. Use your notes from class to determine a good time to make your observations for the week. The Moon will be up in the sky for at least nine hours every day. You can use this fact to avoid having to observe in the dead of night or very early in the morning. A little planning will go a long way.

Now that you have planned out your observation, it is time to go out to look at the Moon. These observations can be done from anywhere that you can see the Moon - **you do not have to go to Parkland to make these observations.**

For each observation you make, you must start by getting yourself oriented. Make sure that you can find the principle cardinal directions (north, east, south, and west). If you are having trouble with this, remember the following:

1) Champaign-Urbana streets are nearly all aligned north-south or east-west. You can use these to help with cardinal directions.
2) On a relatively clear night, you should be able to find Polaris. Remember that Polaris is near the North Celestial Pole in the sky.
3) During the day, remember that the position of the sun can be a guide in determining cardinal directions. The sun will be due south at noon (1pm while on Daylight Saving Time). It will rise to the north of east and set to the north of west during spring and summer, and it will rise to the south of east and set to the south of west during fall and winter.

Once you are oriented to the cardinal directions, you will need to record the following information:

- Date of the Observation
- Time of the Observation
- Position of the Moon in terms of cardinal directions (NE, S, SSW, etc.)
- Estimated Rise Time
- Phase of the Moon
- Sketch
The time of the observation and the location of the Moon are important in determining the estimated rise time of the Moon. If you are observing the Moon close to the horizon in the eastern part of the sky, the Moon has recently risen. If the Moon is due south, it rose approximately 6 hours earlier. If the Moon is setting in the west, it rose approximately 12 hours earlier. Estimate the rise time of the Moon as accurately as you can for each of your observations. Remember that you can also use your class notes if you need help estimating the rise time of one of the major phases.

For the sketch, draw a circle for the Moon and then shade in the dark portion of the Moon (if any).

Record as many observations as you can for the week. At the end of the week, you will be required to submit what you think are your three best observations. You will do this through our Angel course space. Log in to the Angel system, click on our class, and then go into the Lessons tab. You will find a folder called "Lunar Project". In this folder, you will find an entry marked "Week 1 Observations". Click on that entry. Then click on the link for "Begin Week 1 Observations" and fill in the required information. You will not be required to submit your sketches.

When submitting your observations, be sure to submit only observations that fall within the specified observing week. From the observing data sheet, you can see that "Week 1" stretches from Monday, 9/13 to Sunday, 9/19. Do not enter observations from any dates outside of that time frame.

Each week of observations is worth 5 points toward your project grade. Be sure to get the observations turned in on time to get full credit.

Do note that you will be expected to get a full set of observations if that is possible. If it has been a particularly cloudy week and you couldn't get three observations, just turn in what you have. You will not be penalized for inclement weather. However, do remember that if it is clear enough during the week to get in at least three observations, you will lose points for missed observations.

Once your chart is completed and all 6 weeks of your observations have been submitted, you will be ready to begin analyzing the observational data you have collected. Instructions for the preliminary analysis section will be posted on the project webpage.