

## **ASTRO 1050 LAB # 1**

### **SEMESTER OBSERVING PROJECT**

#### I. Objective

Over the course of the semester, you will have the opportunity to observe many things, thereby imitating astronomers throughout history. Although contemporary astronomy is largely an indoor science, visual and telescopic observations are fundamental. Everything we know about the universe is either supported by observations or hinges on the support of future observations. Most of the observations you will make this semester will be similar to those that have been made by countless numbers of astronomers throughout history. However, they will be unique to you, and give you the opportunity to discover the nature of the universe for yourself.

Students often ask, “What is a good observation?” or “What should I draw?” Frustrated Astro 1050 instructors typically respond, “Draw what you see.” The lesson is clear. An observation will depend on an observer’s eyesight or other equipment used to make the observation, and one’s ability to sketch in the dark. Even with this element of uncertainty, however, everyone’s sketch of a Full Moon should be circular, the Andromeda Galaxy should not look like Jupiter, and the North Star should always be drawn roughly North. You should strive to record what you see as accurately as possible, but only in as much detail needed to clearly distinguish your object from another. You need not draw every star in Orion to obtain the general shape, for example.

**One note: You will see in Lab #2 that the position and visibility of the stars depends greatly on when you are doing your observing. In order to be acceptable, every drawing MUST have the following information:**

1. The date,
2. The time,
3. The direction you are facing and the directions to your left and right
4. A label of what you have drawn.

**Without this information, you have only made a drawing, not an Observation that contains useful astronomical data!**

#### II. Activities

The semester observing project will consist of three activities.

1. Naked eye observations of stars, constellations and planets
2. Telescopic observations using the telescopes on the roof of the Physical Sciences Building
3. Naked eye observations of the Moon and its phases

Each activity is described in more detail on the following pages, along with checklists to help you keep track of what you have and haven’t done. All observations for all activities must be

meticulously recorded in your observing book (the lab notebook) with all the above information. At least once per month, your instructor must check over your work to make sure that (1) adequate progress on the project is being made, (2) that the observations are satisfactorily complete and of reasonable quality.

Good luck and enjoy your semester in Astro 1050!

### Activity 1: Naked Eye Observations

**All observations must be completed by semester's end.** You only need to turn in one observation of each object, but you are encouraged to observe objects more than once until you feel that your sketch is a good one. Observations will be graded on completeness, accuracy, and clarity.

On the next page, there is a table of constellations and stars that you will need to observe for this part of the semester project. (Make sure you are looking under the correct semester.) Space has been left at the bottom as your instructor may suggest other objects, such as planets or comets, which are only visible at special times. Also note that the shapes of these constellations are subject to interpretation. The constellation of Ursa Major has been identified both as a large animal and a kitchen utensil. Which is it? Again, the best rule of thumb is to see for yourself. If you see a teapot instead of an archer when observing Sagittarius then remember it as a teapot. When lying on its side, Orion may look to you like a giant bow tie rather than a hunter; feel free to use your imagination.

Your sketches for Activity 1 will be semicircular sketches of the sky as shown in the sample sketch on the following page. The semi-circle is used to depict the half of the sky that you are facing. The horizon is depicted by the flat portion of the semi-circle. Objects seen directly overhead should be drawn at the top of the frame. The corners of the semi-circle are reserved for objects seen on the horizon directly to your left and right. Since the sky you observe depends on date, time, direction, and observing locale, you must record this information near all sketches. You may include as many stars, constellations, and planets in one sketch as you wish without making the sketch incomprehensibly congested. All objects **MUST** be clearly labeled. Furthermore, parts of the horizon may be obscured by buildings, trees, etc. These should be clearly and accurately depicted and labeled in your sketch.

Star charts to help you find constellations are available online, e.g., at <http://www.heavens-above.com>. A link with the proper information for observations from the University of Wyoming campus is available from the course web page. Please note that the projection of sky used in the star charts is not the same as the observations you will be making. In the star charts, the horizon is shown as the outside, circular border. They depict the entire sky, as if you are lying on your back. The observations that you will be recording require you to be standing, where you can only see half of the sky without contorting your body. The charts may be used as a guide to help you find the constellations. Observations that resemble star charts will be considered cheating.

**Activity 1: Naked Eye Observations Checklist**

<b>Fall Semester</b>	<b>Spring Semester</b>	
Ursa Major (Big Dipper)	Ursa Major (Big Dipper)	
Ursa Minor (Little Dipper) with <i>Polaris</i>	Ursa Minor (Little Dipper) with <i>Polaris</i>	
Auriga (the Charioteer) with <i>Capella</i>	Auriga (the Charioteer) with <i>Capella</i>	
Cepheus (the King)	Cepheus (the King)	
Cassiopeia (the Queen)	Cassiopeia (the Queen)	
Cygnus (the Swan) with <i>Deneb</i>	Cygnus (the Swan) with <i>Deneb</i>	
Boötes (the Herdsman) with <i>Arcturus</i>	Boötes (the Herdsman) with <i>Arcturus</i>	
Lyra (the Lyre) with <i>Vega</i>	Lyra (the Lyre) with <i>Vega</i>	
Pegasus (the Winged Horse) with <i>the Great Square</i>	Pegasus (the Winged Horse) with <i>the Great Square</i>	
Perseus (the Warrior)	Perseus (the Warrior)	
Taurus (the Bull) with <i>Aldebaran</i>	Taurus (the Bull) with <i>Aldebaran</i>	
Scorpius (the Scorpion) with <i>Antares</i>	Orion (the Hunter) with <i>Betelgeuse</i> and <i>Rigel</i>	
Sagittarius (the Archer)	The Pleiades (the Seven Sisters)	
Summer Triangle with <i>Deneb</i> , <i>Vega</i> , and <i>Altair</i>	Leo (the Lion) with <i>Regulus</i>	
Aquila (the Eagle) with <i>Altair</i>	Canis Major (the Big Dog) with <i>Sirius</i> (the brightest star in the night sky)	
Virgo (the Maiden) with <i>Spica</i>	Canis Minor (the Little Dog) with <i>Procyon</i>	
Hercules (the Strongman)	Gemini (the Twins) with <i>Castor</i> and <i>Pollux</i>	



**Activity 2: Telescopic Observations Checklist**

Fall Semester	Spring Semester
Mizar and Alcor in Ursa Major (double star)	Mizar and Alcor in Ursa Major (double star)
Albireo in Cygnus (double star)	The Orion Nebula
M13 in Hercules (a globular cluster)	The Pleiades (an open star cluster)
The Andromeda Galaxy (M31)	M15 in Pegasus (a globular cluster)

**Activity 2: Telescopic Observations**

Occasionally during the semester, the lab instructors will provide opportunities for observing the objects listed in the above table using the telescopes on the roof of the Physical Sciences Building. Again, space has been left intentionally blank for planets or other objects which may be visible at special times. A sample observation for Activity 2 is given below. Telescopic observations capture a very small portion of the sky, and thus should not be semicircular. Draw your observations within a circle that represents the edge of your field of view. The same rules for time, date, etc. apply.

**Sample Sketch for Activity 2**

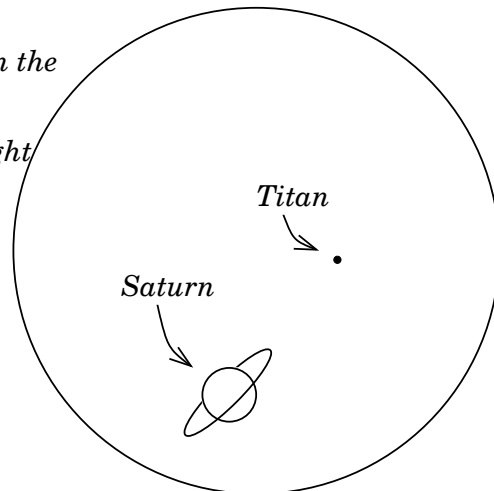
**Telescope Sketch**

**Title:** Saturn & Titan      **Observing Site:** Phys. Sci. Roof

**Date and Time:** Tues, Nov 27, 2001, 9:00pm      **Sky Condition:** clear

**Description:**

*Looking through 8-inch telescope on the roof of Phys. Sci. Saturn was yellowish-grey. The rings were bright and visible. Titan looked just like a white dot, much like a star.*



### **Activity 3: Naked Eye Observations of the Phase of the Earth’s Moon**

For this activity you will sketch the shape, appearance, and position in the sky of the Moon on different dates. Your lab instructor will choose a two week time period over which to observe the Moon. During these two weeks, you must choose a time over which to observe the Moon **at the same time every single day/night**. (Confer with your lab instructor for suggestions of appropriate times in the given two week period.) For each observation within this two-week time period, make a naked-eye observation in the same manner as in Activity 1, facing South with due West to your right and due East to your left. If desired, these can be combined with observations for Activity 1. The instructors appreciate that sometimes “life” can get in the way of a project that takes two weeks to carry out. Hence, to receive full credit for this activity, you must make at least ten observations in the two week period.

Each observation of the Moon must include:

1. Date and time of the observation
2. Description of observation
3. Sky conditions
4. Compass directions
5. Sketch of the moon’s location in the sky (see example on page 4)
6. Sketch of the “shape” of the moon. If the moon is only partially illuminated, make a careful note of which side, left or right, is lit.

As the Moon orbits the Earth once every month, we see the side of it that is illuminated by the sun from different angles. That is what causes the Moon to appear to go through phases. Each phase corresponds to a different angle between us (Earth), the Moon, and the Sun. For example, Full is when the Earth sits between the Moon and the Sun; at that time, the illuminated half of the Moon is facing us. If the Moon, Earth, and Sun make a right angle, then we see only half of the side of the Moon illuminated by the Sun, and this is called first or third quarter phase (depending on which side of the Moon is lit).