Introductory Astronomy Lab – **Project Discussion** – V1.1

NAMES (include all group members):

Introduction: Many studies show the benefits students receive from project-based learning which reinforces both fundamental and practical skills. Among the purported benefits are critical thinking skills, building collaboration as well as independent skills, pragmatic skills especially associated with technology, and lifelong learning.

☞ Today, you will choose a topic for your semester project and learn the basics of scientific research. You will work in a group of 3-4 people. You will give a 10-minute presentation of your project during the last week labs meet, which is November 7 – 11.

Learning Objectives & Science Process Skills for the Term Project Include:
▶ **Interpreting and Manipulating Data**: Students will learn to analyze and interpret data from various sources. This includes mathematical relationships.
▶ **Classification**: Classifying objects and events according to similarities and differences.
▶ **Hypothesis**: Can construct a scientific hypothesis.
▶ **Predicting**: Make predictions based upon prior knowledge.

Topics: Any topic in 1020 is acceptable. Projects do *not* need to be strictly scientific in nature, they can include other disciplines such as history, psychology, politics, etc. However, every project has to be directly related to material from 1020. Possible topics can be related to any of the following:

- Black Holes
- Dark Energy
- Dark Matter
- Galaxies
- Light
- Stars – Sun, Dwarfs, Giants, etc.
- Supernovae

The topics listed above are very broad. In general, you will want to narrow down your topic. For example, there are thousands upon thousands of research articles on *Black Holes*. Black holes is such a large focus of research that it's unrealistic to try and capture everything. You will want to narrow your topic down to something more manageable such as "Sgr A*" or the "IMBH", etc.

♪ Don't fret, your TA will help you decide upon a reasonable topic!

Project Proposal

In your proposal, you will need to provide an "outline". The outline should describe the focus of your project. It should address the following:

A)Why did you choose your particular topic?
B)What do you hope to learn?
C)Why is the topic of interest to astronomers and your fellow classmates?
D)How will you present your project?
E)What are at least three primary sources you have found?

☞ This proposal only needs to be a few sentences. That said, you are welcome to include as much information as you would like. Please make sure to write in complete sentences, use proper grammar, and keep everything legible. An example is included on the next page.

Approach: There are many possible project ideas. Your project may take the form of any of the following:

- Art – Including a painting, comic book, etc.
- Book – Children's book, fiction, non-fiction, play, etc.
- Instrument – Build an astronomical instrument such as astrolabe, telescope, etc.
- Performance – Interpretive dance, song, etc.
- Programming – Write some good code.
- Video – Sketch, whiteboard animation, etc.
- YOU HAVE AN IDEA? Run it by your TA!

☞ The following are *not* allowed: Research paper, slide presentations including PowerPoint, Google Slides, Keynote, Prezi, etc.

No two groups may present a similar topic even if the presentations are different.

Research & Citations You should feel free to use resources such as Wikipedia to look-up basic facts and resources. However, Wikipedia is not an acceptable source itself. Primary sources include papers, scholarly/educational sites and people, NASA-related work, textbooks, etc. Citations should include: **the author, title, publisher, and year**. In general it is good policy to include the complete website address. However, you do not need to write out the full URL by hand for this lab - although you are welcome to do so if you wish.

? *What if after we start working on our project we need to change something?* No worries! This happens all the time in science, and truly any field, discipline, and job. If you are starting to look into your topic and decide it is too mathematical, or perhaps it's a bit boring, you can always change your topic or approach. However, you do need to run it by your TA to make sure there are no problems.

Project Proposal – Example

Group Members: Nicolaus Copernicus, Edwin Hubble, Hypatia of Alexandria

Project Topic: Stephenson 2-18

Outline:
A)Stephenson 2-18 is one of, if not the, largest stars! Our Sun is so tiny in comparison that it is mind-blowing.

B)Our group wants to learn more about this star. In particular we hope to answer two primary questions we have: 1)How or why is this star so large? 2)Can stars get even larger?

C)Stephenson 2-18 seems to defy expectations. Although its actual size is not known for certain, it may be much larger than theory predicted, which makes it a game-changer if true.

D)We have decided to make a whiteboard presentation.

E)
1)"How big is the biggest star we have ever found?" by Jillian Scudder . Published 2015 in The Conversation.
https://theconversation.com/how-big-is-the-biggest-star-we-have-ever-found-37304

2)"The Most Massive Stars Known" by NASA. Publication date is unknown.
https://spacemath.gsfc.nasa.gov/weekly/7Page22.pdf

3)"Exploring the Mass-loss Histories of the Red Supergiants" by Roberta M. Humphreys et al. Published in the *Astronomical Journal*
https://iopscience.iop.org/article/10.3847/1538-3881/abab15

Project Proposal

Project Topic:

OUTLINE: