Term Projects:
Detailed Outline Due July 2\textsuperscript{nd} (1/4 of final project grade)
Presentations: July 23\textsuperscript{rd} (3 bonus points)
FINAL DUE DATE: July 25\textsuperscript{th} (points WILL be deducted for late projects)

Dark Matter

Assignment 1
I want you to find the reason why people think dark matter exists/ does not exist. Please include observational evidence for dark matter.

Here are some websites that might help you get started:
http://www.eclipse.net/~cmmiller/DM/
http://chandra.harvard.edu/xray_astro/dark_matter/index.html

Black holes

Assignment 2
What are the characteristics of a black hole? What remains a mystery about them? Some guided math is required in order to help understand more about black holes.

Assignment 3
Will Blackholes destroy the Earth?

Will the Large Hadron Collider (LHC) create a black hole which will destroy the Earth?

Assignment 4
What sort of catastrophic events cause Gravity Waves? How do we hope to detect them using such instruments like LIGO and LISA?

Extraterrestrial Life

Assignment 5
Extremophiles Poster/Paper/Powerpoint

Read the paper by N.J. Scott on extremophiles that could possibly live on different planets/ objects in our solar system. Give a brief overview of his paper and then find one particular interesting species and do some additional research on it. Explain what other planets this species could live on and why.

Planets

Assignment 6
Hypothetical Planets

http://www.solarviews.com/eng/hypothet.htm

What planet did Le Verrier find? What planet did he say that existed and did not? What is one other projected world that does not exist and why?
Pick which one from the list sounds the coolest and tell me why you think so.

**Assignment 7**
What methods do we use today to find exoplanets? Carefully explain the how methods work. What have we found so far, and how do these newly discovered planets compare to those in our solar system?

**Assignment 8**
Define a Planet

Make your own working definition for a planet, Star, moon, Asteroid and comet. Then, decide which category the major objects in the solar system belong to. Feel Free to create new classes of celestial bodies if you need to. Think about all possibilities, If you have two earth sized objects orbiting together, If you had a 5 Jupiter mass object floating by itself without a star, A dead comet that has lost its ice and gas, etc. Your definitions should be robust enough to classify any new objects that might be discovered.

**Assignment 9**
Planets missions


Compare two of the projected space missions as if you are a legislative assistant. Then, write a detailed brief explaining to your congressman/woman who he/she should fund and who not.

**Sun / Stars**

**Assignment 10**
Create a 3D HR Diagram

Show all stars with their relative colors and size on the correct position of the diagram. The Third dimension should be an accurate representation of some facet of the stars other than luminosity and temperature: (lifetime, radius, mass, proportion in Solar neighborhood, distance to nearest known type, etc).

**Assignment 11**
Create a Children’s Story Book on the Sun

It should contain good factual information and must be at least 10 pages long. Be sure to state ahead of time the age group you plan to write for. If you choose not to keep the book, I’ll be donating them to a local children’s library. It therefore needs to be high quality, both in binding and pages. See Lab 32.

**Assignment 12**
Create a Children’s Story Book on the Solar System.

It should contain good factual information and must be at least 10 pages long. Be sure
to state ahead of time the age group you plan to write for. If you choose not to keep the book, I’ll be donating them to a local children’s library. It therefore needs to be high quality, both in binding and pages.

See Lab 32.

Assignment 13
Create a Children’s Story Book on the Stars

It should contain good factual information and must be at least 10 pages long. Be sure to state ahead of time the age group you plan to write for. If you choose not to keep the book, I’ll be donating them to a local children’s library. It therefore needs to be high quality, both in binding and pages.

See Lab 32.

Assignment 14
Build a Sun Dial to Keep Track of Time

http://www.all-science-fair-projects.com/science_fair_projects/7/58/20a55c23d58101aa6aaa50177c6089b0.html

What are sun dials and how do they work? Is there any historical significance? Build your sun dial and keep track of the time. It should work in Atlanta!

Assignment 15
Supernovas

Why do Astronomers believe Betelgeuse will go supernova? How soon might this happen? What are some other possible futures for Betelgeuse?

Assignment 16
Constellations in perspective

Choose 2 constellations and show how they would look from another perspective. The easiest way to do this is probably making a 3D model. First find the distance to all of the main stars of a constellation. Then, using some scale distance that seems appropriate cut sticks representing the relative distance between the stars of the constellation. Finally mount these to a hard backing at the proper coordinates on the celestial grid to create a 3D model of the constellation. (If you really want to be impressive, use correctly colored Christmas lights)

Galaxies

Assignment 17
Galaxies Poster

Create a poster that explains the different types of galaxies and their characteristics (elliptical, spirals and irregular dwarfs). See Hubble’s Tuning Fork.

Assignment 18
Measuring Distances in the Universe

Make a poster illustrating how far into space different techniques in astronomy can measure. Describe these techniques on the poster.
See your text and this website for help.
(http://www.astro.ucla.edu/~wright/distance.htm)

**Assignment 19**
Milkyway Exploration

Make a poster of the Milkyway. Describe its features, where we are located, bright nearby stars, and how you know this information. Be sure to point out the location of famous objects, like the crab nebula and the Pleiades.

**Space Exploration**

**Assignment 20**
Man vs. Robot

Choose a side in the argument for/against manned space missions. Defend your side with facts and reasonable arguments. Be sure to list possible drawbacks for your viewpoint and why these are outweighed by the potential benefits realized by your side of the debate.

**Assignment 21**
Astronauts in Space

Explain the dangers that humans may/are incurring from space travel, as well as how we will/can overcome them. What additional dangers await astronauts traveling to Mars? The outer solar system? Beyond?

**Assignment 22**
Terraforming/ Second Earth

Realistically look into if it is possible to create a second Earth. What planets or moons in our solar system might be up for the job? How would you respond to nay sayers who feel that it is wrong to destroy these pristine planets on such a complete and total scale?

**Assignment 23**
Landing on the Moon

Did humans land on the moon? Why do some people still propose that we have not? What scientific fact contradicts their accusations?

**Assignment 24**
Discuss the Benefits/problems associated with building a Space Elevator. What are the largest hurdles left to overcome? What is your opinion of the Space Fountain?

Check out http://www.spaceward.org/elevator2010 to see the latest developments.

**Assignment 25**
Killer asteroids

What are the chances of an asteroid wiping out life on earth? How large would such an
asteroid have to be? What are the chances that we would see such an asteroid? What methods might we use to deflect and/or destroy it?

Miscellaneous

Assignment 26
Global Warming

Is it real? Find Scientific evidence to support your claim. If it is, what are the possible causes, and how can we prevent its escalation? What will Earth look like in the future?

Future Topics:

Other topics (Please Discuss with TA):
Active Galactic Nuclei
Neutron Stars/ Pulsars