

Lecture 1

ASTR 288C Special Projects in Astronomy: Astronomy Research Techniques

Instructor:

Stephen Holland

Stephen.T.Holland@nasa.gov

301-286-7063

Office Hours:

By appointment

Textbooks:

None

Course Web Site:

To be determined

Homework and Grading

- One homework assignment per lecture
- Due at start of next week's lecture
- Homework returned in next lecture
- Assignments have equal weight
- The lowest assignment will be dropped

- Research project based on course work
- Build on work done in class
- Present results in last class
- 5 minute presentation
- Short research report.

- No exams

- Grading
 - 60% — Homework
 - 40% — Research Project

Course Work

- One class per week
- Monday 1530 to 1715

- 45 minute lecture
- 45 minute lab period

Course Requirements

- 1st year physics
- 1st year maths
- knowledge of basic astronomy

- basic computer skills

- basic Web skills

Academic Integrity

- Students are encouraged to collaborate and discuss lectures and course material. Homework is to be done individually and each student must hand in unique work. Copying from another student is not acceptable. Any homework that is found to be a copy of another student's homework will receive a grade of 0.
- Students must comply with the Honour Pledge of the University of Maryland as listed at
<http://www.studenthonorpledge.umd.edu/>
- Academic dishonesty consists of cheating, fabrication, facilitation, and plagiarism. See the Web site for details. These behaviours will not be tolerated.

Research Ethics

Science is based on honesty

Some examples of unethical behaviour

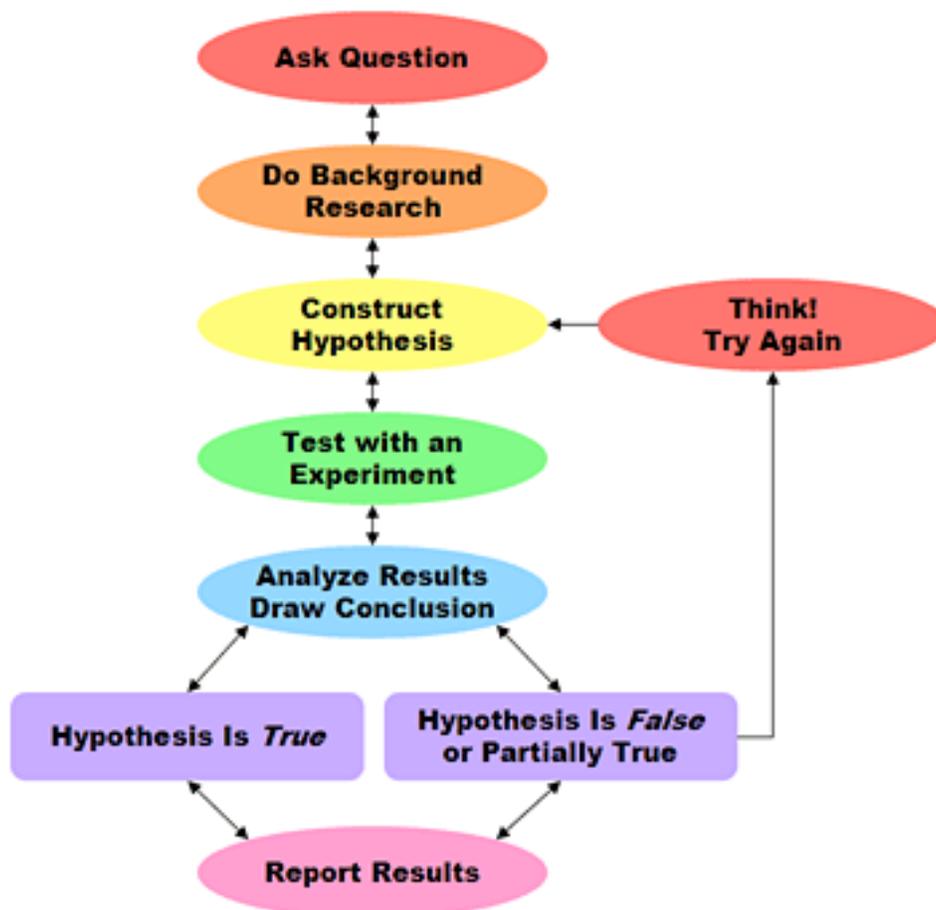
- Plagiarism
- Falsifying data
- Deliberate misinterpretation of results
- Failure to credit previous work

- Peer review
 - Published work is reviewed

- Duplicating work
 - Other groups repeating work
 - Results that can not be duplicated are usually not believed

The Scientific Method

- Observe a phenomena
- Construct a hypothesis
- Perform an experiment to test the hypothesis
- If the prediction is not observed then reject the hypothesis and start again
- If the prediction is observed then test another prediction
- Report your results



- The scientific method is objective.
- It does not depend on personal interpretation.
- Allows theories to be replaced.

Never reject an experimental or an observation because it is not what you expected it to be.

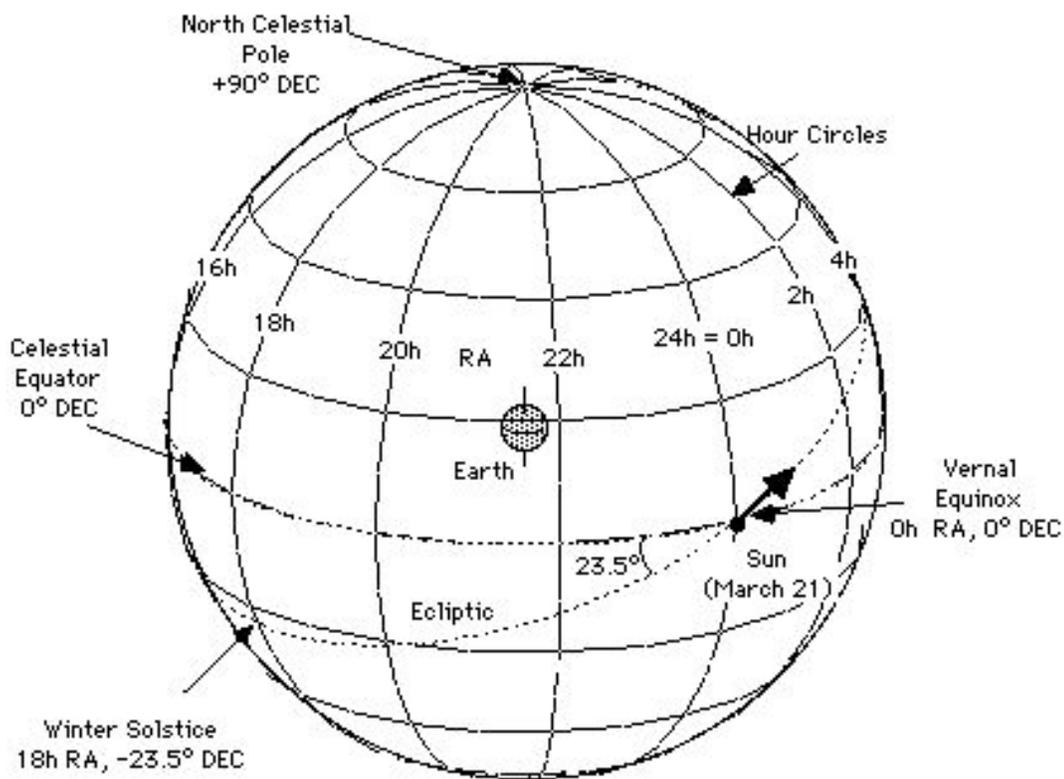
Celestial Coordinate System

Astronomical Coordinate Systems

- Celestial equatorial
- Galactic
- Ecliptic

Celestial Equatorial Coordinates

- Analogous to latitude and longitude
- Angular coordinates
- Celestial equator
 - Projection of the Earth's equator onto the sky
- Celestial poles
 - Projections of the Earth's poles onto the sky



- Right Ascension (longitude) measured in hours:minutes:seconds of time
 - 0 hours to 24 hours
- Declination (latitude) measured in degrees:arcminutes:arcseconds
 - $+90$ degrees (North Celestial Pole) to -90 degrees (South Celestial Pole)
- Precession causes coordinate system to drift.
- Current epoch: 2000.0

Magnitudes

- Logarithmic scale
- mag 1 → 2.5 × brighter than mag 2

$$m = K - 2.5 \log_{10}(f)$$

m = magnitude

K = photometric zero points

f = flux density

units are set by K

- **apparent magnitude**
 - observed magnitude
- **absolute magnitude**
 - magnitude of the source at 10 parsecs

$$M = m + 5 - 5 \log_{10}(d)$$

M = absolute magnitude

d = distance (parsecs)