

ESS 102 Space and Space Travel

Instructor: Dr. Jeremy Thomas (jnt@u.washington.edu)

Office Hours: Dr. Thomas: Mon and Wed 2-4pm or by appt.

TAs:

- James Prager (jprager@u.washington.edu),
- Race Roberson (raceman@u.washington.edu),
- Michael Shimogawa (shimo@u.washington.edu)

Course Expectations

- High School Science and Math Skills
 - Basic Understanding of Physics (*Atoms, Molecules & their Parts, Energy, Waves, and Momentum*)
 - Ability to use Basic Mathematical Techniques: (*Algebra, Geometry, and Scientific Notation*)
- Computer Literacy: (*Web resources*)

Course Expectations

- **Textbook (required):** *Sun, Earth, and Sky*, Second Edition, by Kenneth Lang, Springer, 2006.
- **Class Room Clickers (required):** TurningPoint
(Set clicker channel to 41)
- **Class Web Site:**
<http://www.ess.washington.edu/Space/ESS102>
(This will provide link to interactive 'Moodle' site)

Course Expectations

- Attendance and On-Time Submission of Assignments:
(Assignments submitted after the week due cannot be accepted without valid excuse)
- Original Work: *(Plagiarism and duplicate assignments will receive a zero grade)*

GRADING

There are five factors:

- (1) *Weekly Assignments* – Lecture, Written, Demo and Computer Labs [30%]
- (2) *Hands-on Projects* - Telescope Run and Water Rocket Competition [10%]
- (3) *3 Tests* – Key Concepts [total of 30%]
- (4) *Writing Project* - write a scientifically correct science fiction article [25%]
- (5) *Classroom Participation* [5%]

Assignments

- **HW:** Almost weekly online assignments via Moodle and 1 or 2 written problems to be turned-in
- **Lab Sections:** Meet twice a week. Hands-on lab to reinforce lecture topics and computer based exploratory assignments. Also, time will be set aside to teach problem solving techniques. Assignments via Moodle and to be turned-in.
- **Final Paper:** Write an original scientifically-correct news/science fiction article (approx. 6 pages). Details TBA.

Tests

- 3 Tests (50 minutes each) with multiple choice, short answer and 1 or 2 problems to work-out.
- Tests 1 and 2 will be held during computer lab on approx. Jan. 29/31 and Feb 19/21.
- Test 3 on March 14 during final lecture period
(NO FINAL DURING EXAM WEEK)

Labs

- Two labs per week: One demo lab and one computer lab/review session
- In first computer lab, you will register with the interactive class website (Moodle)

What is this class about?

Scope of space science: From the surface of the earth to the heliopause (note that heliopause is where the sun is no longer dominant energy source, well past orbit of Pluto)

- **The Sun:** We will spend a lot of time talking about the Sun, since it is source of essentially all energy in our solar system.

What are the important characteristics of our solar system?

- **Space Propulsion:** How we can explore our solar system?

Tentative Weekly Schedule:

<u>Week</u>	<u>Topics</u>
1	The big picture: Overview and introduction to space.
2	Matter and light: Atoms, spectra, solar power
3	Layers of the Sun: The core, radiative, and convective zones
4	The magnetic Sun and the solar atmosphere (Test 1 on about Jan 29/31)
5	Planetary magnetic fields and the solar wind
6	Space Weather: Aurora, radiation belts, and space hazards (1 st draft of paper due, TBA)
7	Planetary motion and orbital mechanics (Test 2 on about Feb 19/21)
8	Rockets and propulsion
9	Solar system formation (Paper due, TBA)
10	Exploring the solar system (Test 3 on March 14)

TBA: A few guest lecturers who are experts in particular field of space science.

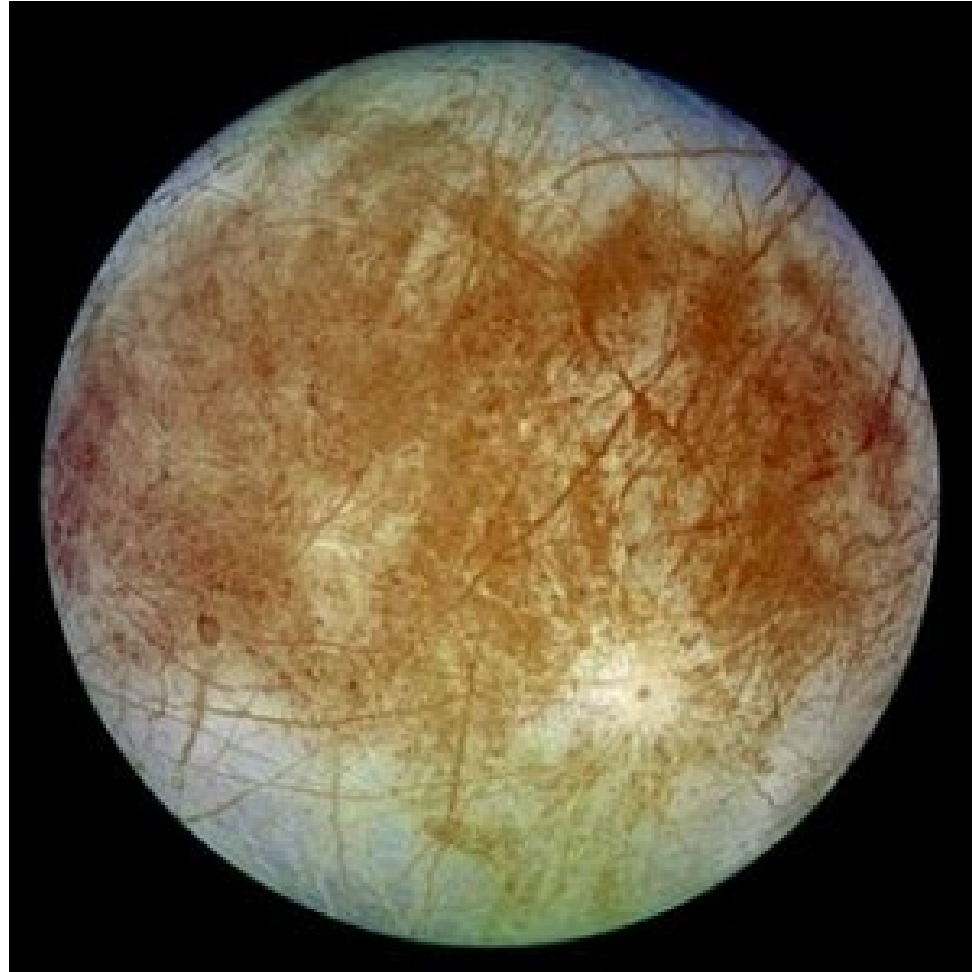
Course Objectives

- Explore the following topics: basics of light and matter, powering of the sun, making of space weather conditions, observations from space and from Earth, Earth's space environment, radiation belts and hazards, plasma storms and auroras, electron beams, spacecraft requirements, tooling up for manned exploration.
- Learn basic problem solving techniques.
- Learn basic observing and experimental techniques.
- Write a scientifically correct paper.

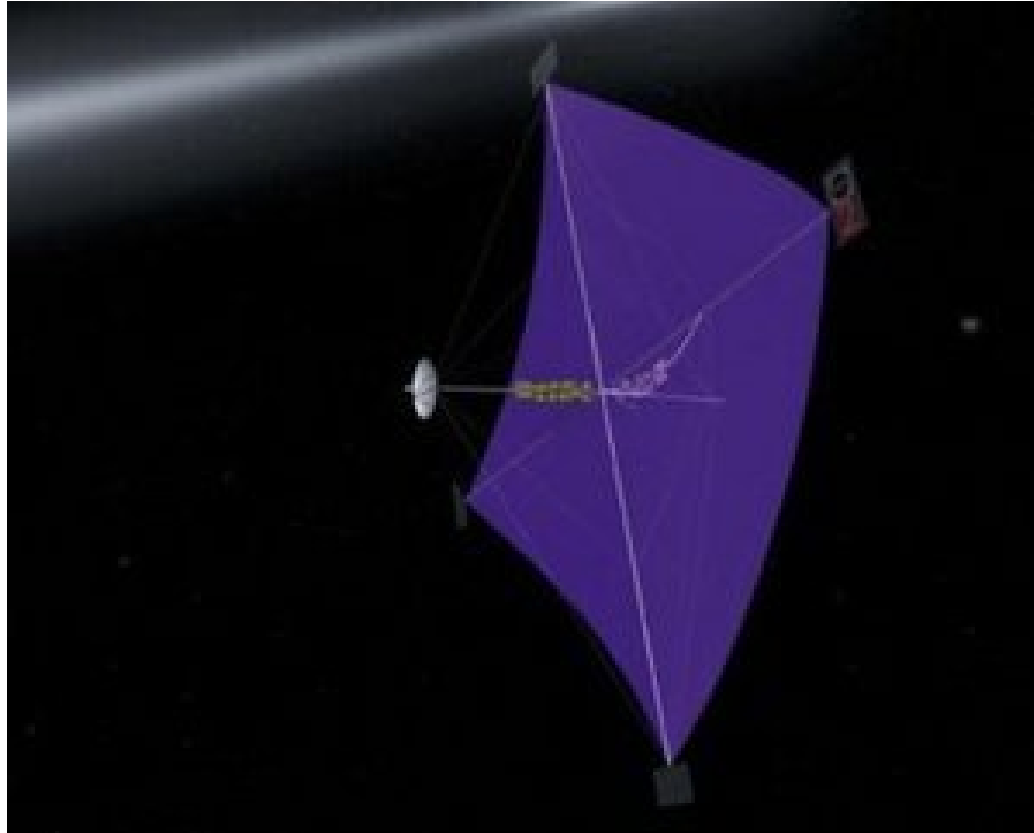
Some things we will discuss:



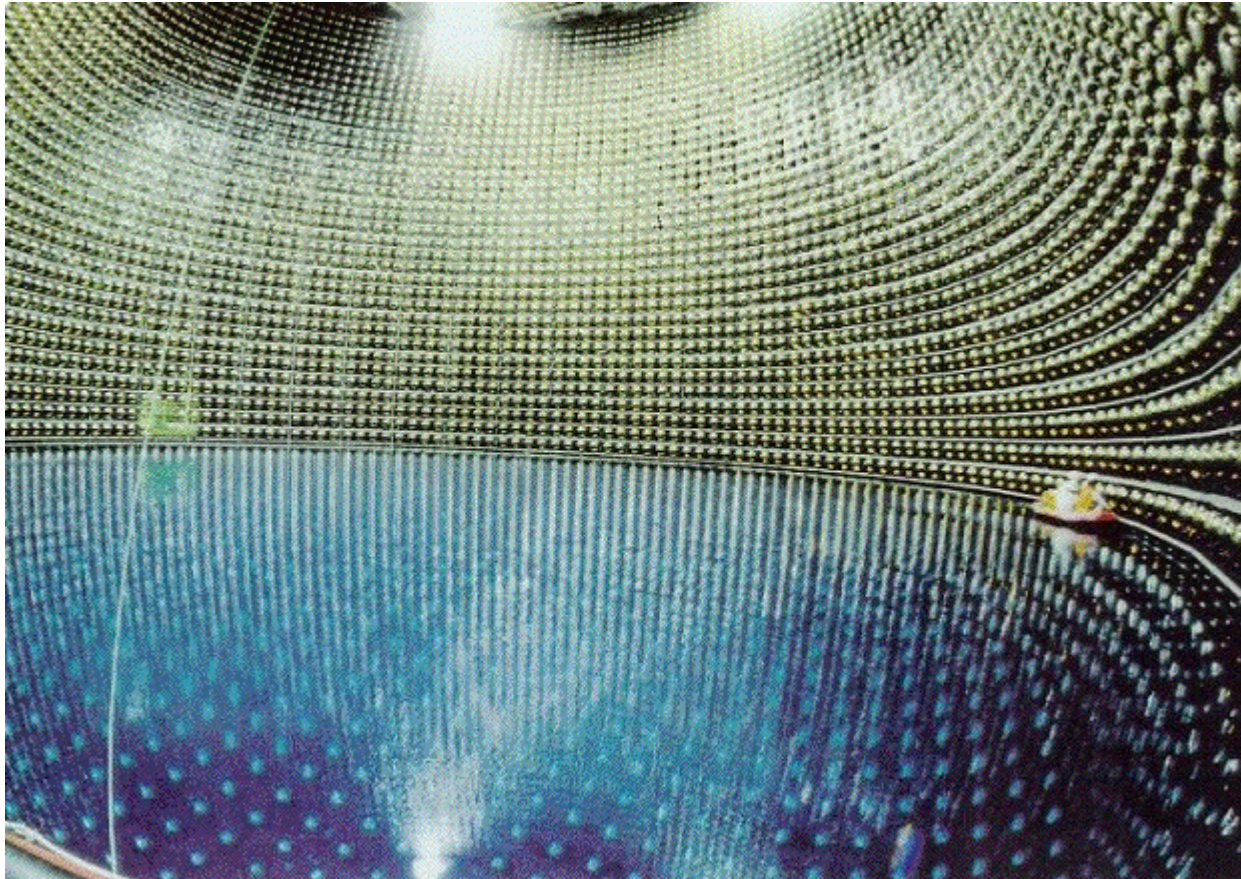
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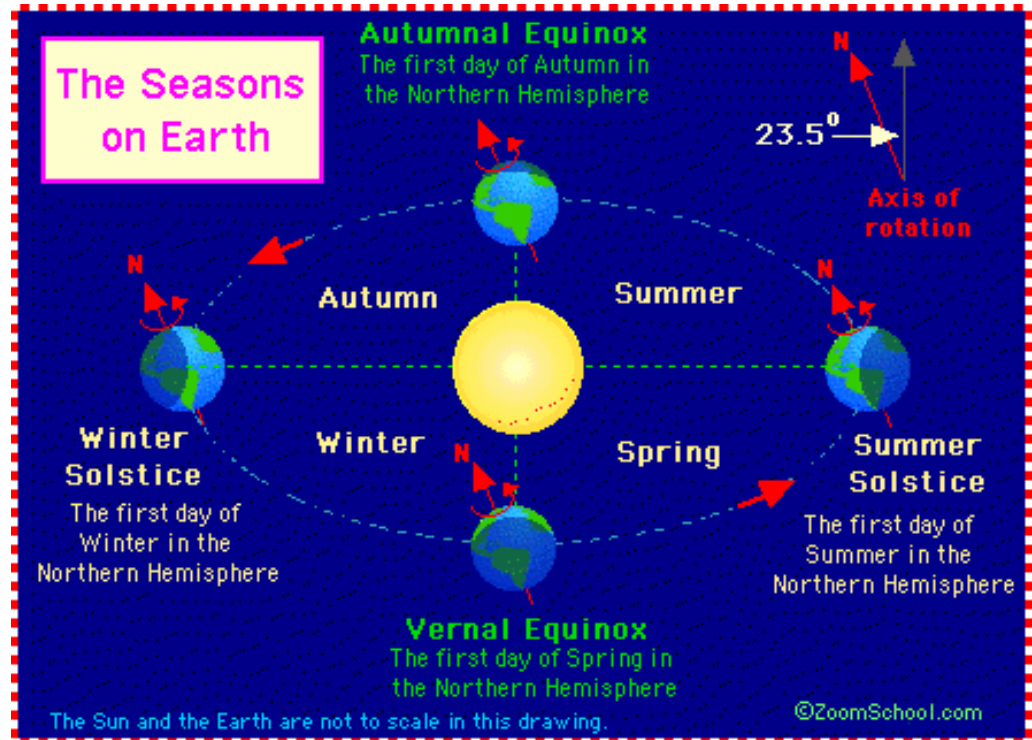
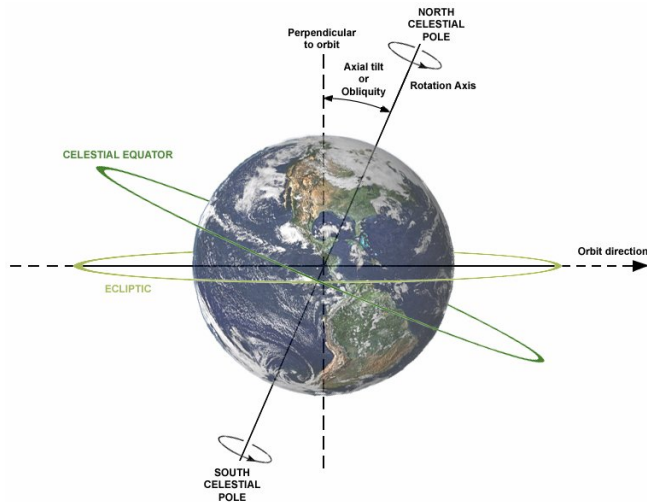
Some things we will discuss:



Why do we have seasons on earth?

1. Change of earth's distance from the sun
2. Tilt of earth's rotation axis relative to its orbit
3. Greenhouse effect

Seasons



Will there be manned exploration of
Mars in your lifetime?

1. Yes
2. NO