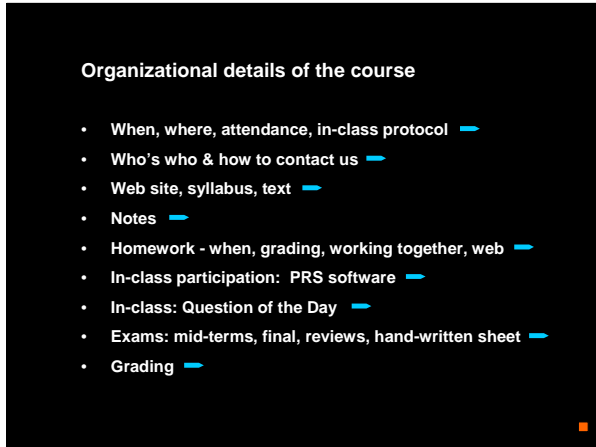




ERTH 1: The Planets Spring 2007

Instructors: Memorie Yasuda
Bernard Minster



Organizational details of the course

- When, where, attendance, in-class protocol ➡
- Who's who & how to contact us ➡
- Web site, syllabus, text ➡
- Notes ➡
- Homework - when, grading, working together, web ➡
- In-class participation: PRS software ➡
- In-class: Question of the Day ➡
- Exams: mid-terms, final, reviews, hand-written sheet ➡
- Grading ➡



Time and place

| | | |
|------------------------|----------------|--------------------------------|
| Class | 4:00 - 4:50 PM | M W F |
| | York 2722 | |
| Office hours | 3:00 - 3:50 | M |
| | York 3030 | |
| Problem sessions | TBA | |
| Final exam | 3:00 - 5:59 PM | Friday, June 15 th |
| Midterm exam | 4:00 - 4:50 PM | Friday, April 27 th |

People

Principle instructors Memorie Yasuda
Bernard Minster

Guest lecturers Wolf Berger
Peter Shearer

Thank you for switching cell phones off during class.



Online resources at:
<http://earthguide.ucsd.edu/planets>

Spring 2003
The Planets
Instructors: Memorie Yasuda and Bernard Minster

Times and locations

| | | | |
|---------------|--------|--------------|-----------|
| Location | PH 101 | 8:00-8:50 PM | 100B-2722 |
| Office hours | PH 101 | 5:00-7:00 PM | 100B-2000 |
| Prerequisites | PH 101 | | 100B-2722 |

Online resources
Website: <http://earthguide.ucsd.edu/planets/planets.html>
Lecture sequence and notes: <http://earthguide.ucsd.edu/planets/lecture.html>

Instructors

| | | |
|-----------------|------------------|--------------|
| Memorie Yasuda | myasuda@ucsd.edu | 951-843-6113 |
| Bernard Minster | minster@ucsd.edu | 951-843-6113 |

Teaching assistants

| | | |
|----------------|-------------------|--|
| Nathan Parker | nparker@ucsd.edu | |
| Jennifer | jennifer@ucsd.edu | |
| Ashley M. Oles | amoles@ucsd.edu | |

Course Description
This is a special topic course on understanding diversity among the planets and moons in our solar system. The planets and their moons will be considered in general terms and some particular details of planet Earth.

Required Course Materials

- Text: The Planets System, 2nd Edition, Cambridge University Press, 2001
- **Reference Tables**: 2002 Planetary Handbook (online) available at the UCSD website.

Grading

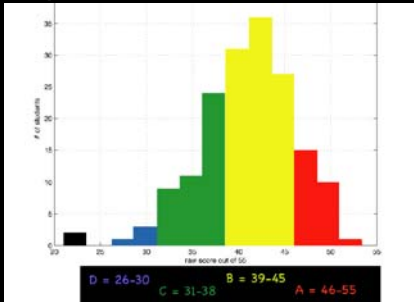
| | |
|-------------------------|-----|
| Midterm exams (2 exams) | 20% |
| Mid-term papers | 10% |
| Sections of the Book | 10% |
| Mid-term exams | 10% |
| Final | 50% |

TOTL: 100%

Components of your course grade

| | |
|-------------------------|-----|
| Problem Sets (homework) | 20% |
| PRS Participation | 15% |
| Question-of-the-Day | 10% |
| Mid-Term Exam | 20% |
| Final Exam | 35% |

Sample Grade Distribution



Class notes







**** Must be in operation by next Monday ****

The PRS system and the clickers



Why use the PRS system?

1. Student participation through interactive questions.
2. To assess learning (yours) and teaching (ours).

How does it work?

1. Multiple-choice style questions. You answer using remote clickers.
2. RF transmitters and receiver on instructors' computers.
3. Software to collect data on instructors' computers.
4. During class you remain anonymous, but you'll be able to see that your answer has been received.
5. Allows in-class display of responses and discussion of answers.

How does it count toward my grade?

1. 25% total: 15% participation + 10% quiz questions
2. Week 1 - trial runs. No loaner remotes. 1 remote per student.

Lecture 1

Introduction to Planets

Why study the Planets?

1. We can learn a lot about how our own planet works.
2. There may be useful resources on other planets.
3. Knowledge about other planets and the experience of exploration may translate into ideas and technologies that are unexpectedly useful back home on Earth.
4. Exploration is a very human activity. Some people want to explore the solar system just because it is there. Some people find objects in our space and our solar system to be aesthetically captivating.

New inventions – Materials

"Langley Research Center's Soluble Imide, a high-performance polymer resin, was discovered while working on a project that never flew, a mach 2.2 aircraft. Robert Bryant was working with a team whose assignment was to develop adhesives and composites that would be required for the primary structural pieces of the high-speed aircraft. The soluble imide, known as LaRC-SI, was discovered in the laboratory by accident. After putting the components for a high-performance polymer into a reactor, a device for creating a controlled chemical reaction, Bryant expected to see the polymer precipitate as a powder once the two-stage reaction was complete, but it didn't. Thinking he had messed something up, he repeated the reactor process with the same, unexpected results, then went down the hall to have a colleague run the reaction and double-check Bryant's conclusions. His colleague got the same reaction."

- NASA

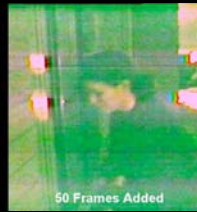
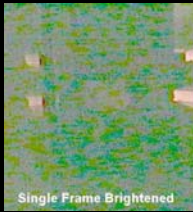
One of the invention's many benefits is in its use as a flexible coating for electronic circuits.

Robert Bryant,
NASA's Langley Research Center



New inventions – Imaging technology - Video Image Stabilization and Registration (VISAR)

"VISAR is a computer algorithm that corrects for zoom, tilt, and jitter. Computer and video images are made up of tiny squares of color called pixels. By registering on an object in the image, the pixels from several video frames can be lined up together. The result is a steadier video."



Dr. David Hathaway and Paul Meyer,
NASA's Marshall Space Flight Center

Examples of Space Agencies

1. National Aeronautics and Space Agency (NASA) —
U.S. governmental agencies —
2. European Space Agency —
3. Japan Aerospace Exploration Agency (JAXA) — —
4. China National Space Administration —
5. Russian Federal Space Agency (Roskosmos) —

Earthrise, December 1968

"Thirty-five years ago this Christmas, a turbulent world looked to the heavens for a unique view of our home planet. This photo of "Earthrise" over the lunar horizon was taken by the Apollo 8 crew in December 1968, showing Earth for the first time as it appears from deep space."

- NASA



The dawn of private space travel

POWER FEEL STEPS DOWN TO FOCUS ON SELLING TICKETS IN SPACE
SAR DEOD UNION-TREBLINE
By SAR DEOD UNION-TREBLINE
November 28, 2008

The founder of Planes, Trains and Automobiles (PTA) has stepped down as chief technology officer and chairman of the board to start a business that will send 20-minute spaceflights into 60 miles above the Earth.

Jan Branson said he has raised \$1 million, mostly from wealthy individuals, for his new company, SpaceCo. He said he plans to raise \$50 million more in his next round of funding.

The concept of space tourism gained recognition after entrepreneur Paul Allen funded the first private vehicle to launch a commercial vehicle into suborbital space. The vehicle, SpaceShipOne, which a rocket engine made by SpaceShipOne's creator, Richard Branson, who has announced plans to build a fleet of commercial spaceflights.

"There's a real race now, with the Russians my hat in the ring," Branson said. "It's between the Russians and the Bransons."

Branson said he expects to launch his space tourism service as early as 2009. He has asked SpaceCo to build a prototype for the "SpaceShipOne" space vehicle, which would cost a total of three passengers. The "Innovative Shuttle" was originally designed by NASA in the 1980s.

Branson said he has simplified the design to offer a touch of luxury for customers. It will launch from a launch pad in the Mojave Desert, California, and will cost between \$100,000 and \$200,000.

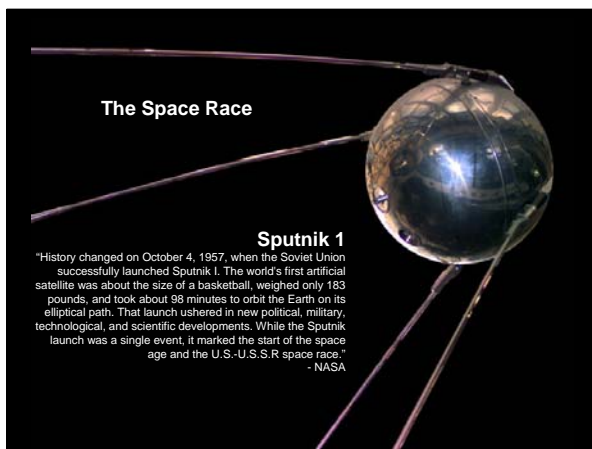
The vehicle would shoot 60 miles above Earth at speeds of up to 3,000 mph, then hover in space for 20 minutes before returning to Earth. It will be the world's fastest and largest sub-orbital vehicle, Branson said.

The Space Race

Sputnik 1

"History changed on October 4, 1957, when the Soviet Union successfully launched Sputnik 1. The world's first artificial satellite was about the size of a basketball, weighed only 183 pounds, and took about 98 minutes to orbit the Earth on its elliptical path. That launch ushered in new political, military, technological, and scientific developments. While the Sputnik launch was a single event, it marked the start of the space age and the U.S.-U.S.S.R. space race."

- NASA



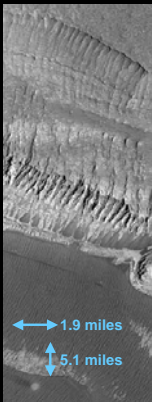
Understanding the Earth - Examples

- The Earth's magnetic field
- Looking for signs of life - water
- The uniqueness of our situation

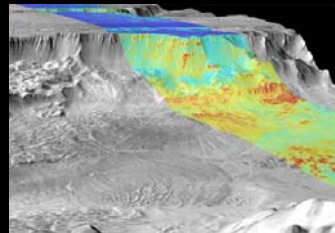
Earth or some other planet?



Round Mountain, an igneous intrusion in Castle Valley. View to northwest, 10 miles east of Moab, Utah
Louis J. Maher, Jr.



← 1.9 miles
↑ 5.1 miles



Mars Odyssey Mission, 2001

Melas Chasma, Mars

Mars Global Surveyor
10.1° S, 74.4° W
July 11, 1999

Earth or some other planet?



Desert pavement in the Mojave.
Karen Schmidt



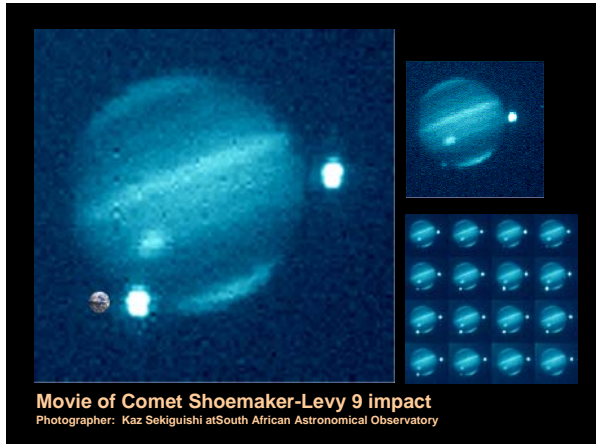
Surface of the "Red Planet"

Comet Shoemaker-Levy 9
Approaching Jupiter

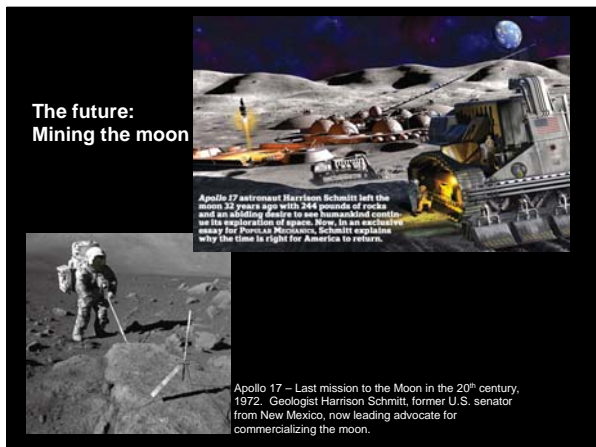
Composite photo from
Hubble Space Telescope
- Jupiter on May 18, 1994
- Comet fragments on May 17, 1994

NASA and STScI U.S. Geological Survey









The future: Back to the Moon?

"America will send a new generation of explorers to the moon aboard NASA's Orion crew exploration vehicle. Making its first flights early in the next decade, Orion is part of the Constellation Program to send human explorers back to the moon, and then onward to Mars and other destinations in the solar system."

- NASA

