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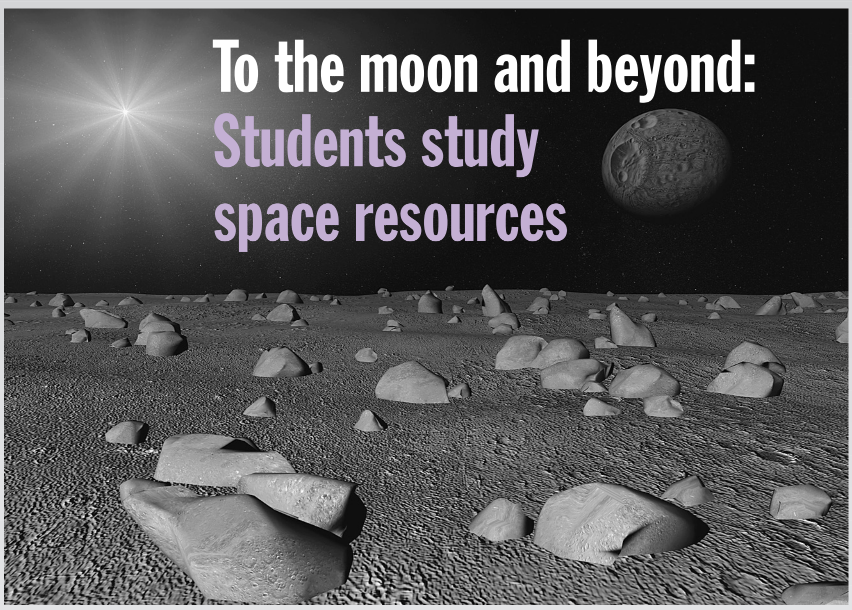
EPISODE

THE DEPARTMENT OF ENGINEERING PHYSICS NUCLEAR ENGINEERING / ENGINEERING PHYSICS / ENGINEERING MECHANICS & ASTRONAUTICS



You could call NEEP 533 a deep-space odyssey. The course, titled "Resources From Space," covers everything from the origins of the universe to public policy and legal issues related to space and is popular not only with engineers, but also with geology, astronomy and physics students.

Adjunct Professor Harrison (Jack) Schmitt team-teaches the course with Professor Jerry Kulcinski and Senior Scientist John Santarius. He brings to it a unique perspective: An Apollo 17 astronaut and a geologist by training, Schmitt was the last man to walk on the moon. In addition, he trained Apollo crews to observe and examine the moon's geology and evaluated lunar samples that returned.

"My primary contribution to the course is in lunar and planetary science," says Schmitt, who at 68 still evaluates and synthesizes research and publishes scientific papers based on theories about the planets' origin and evolution.

In his early lectures, he sets the historical stage for exploring deep space. This year, a new discussion took students all the way back to the sequence of events that led to the solar system's formation—knowledge, he says, that isn't often covered. "It's how you transition from that very broad astrophysical discussion to actually getting a sunlike star with earthlike planets around it," Schmitt explains.

In addition, he talks about how planets and asteroids came into existence and chemically became the way they are. He discusses in detail the moon's origin and evolution and covers how Mars came to be. Another new lecture covered the nature of NASA management during the Apollo era and why the system was so successful during a time of many space failures. "Even though it was 30 years ago, it can help you understand what it's going to take to make it work again, whether it's a private initiative or a government initiative," says Schmitt.

The government versus private question is a springboard for discussions in which he talks about space law, what it takes to write a business plan and attract investors for space ventures, and governmental and private management of new programs. This year, the latter lecture raised issues brought to the fore by President Bush's timely proposal to establish a station on the moon.

"The president's initiative for NASA talks about using only the existing stable of what are called expendable launch vehicles that are being built for getting satellites into orbit," Schmitt says. "They're going to take a very different approach than the private sector would, because the private sector would be focused very narrowly on getting back to the moon with fairly large payloads. That means you need much larger rockets than the existing stable."

The value of lunar resources—particularly helium-3, which might be used for producing electricity on Earth—would make establishing a station on the moon commercially feasible, he says. "It's a resource that has such a high value both commercially and environmentally for use here on Earth that I just don't think humankind will ignore it forever," says Schmitt.

He predicts that while the Earth's population will double by the year 2050, the energy demand will increase by at least a factor of eight and our heavy reliance on fossil fuels won't be enough. Energy produced with helium-3 extracted from lunar soil will be part of a global solution that includes wind, solar, bioenergy, hydrogen and other alternatives, he says.

Combining science and engineering forces, other course discussions address what it would take to get to the moon, Mars and asteroids, and access their resources. Kulcinski delivers several lectures about extracting lunar volatiles, nuclear fusion for energy, fission energy for space power and propulsion, and solar energy and using the moon as a platform for collecting it, while Santarius talks about spacecraft trajectories, plasma thrusters and nuclear fusion for propulsion. In addition, students also hear lectures from Astronomy Professor John Gallagher, Geology and Geophysics Professor Phil Brown, rocketry and space-flight expert Michael Griffin, and University of Tennessee Professor Larry Taylor, an expert on the nature of lunar surface materials.

Most courses today are narrowly focused; this one encourages students to think in broad, multidisciplinary terms, says Schmitt. "I think it's good for students to be exposed to something that is truly multidisciplinary and to have to think in terms of how various disciplines relate to each other—all the way from the pure science of astrophysics to the other end of the spectrum of how does that relate to public policy, and to see the continuum between the two."

The group, which has offered "Resources from Space" every couple of years since 1996, is videotaping each lecture and will compile the course electronically using e-Teach, an authoring tool developed by Professor Greg Moses. Their current effort is funded by the Burndt Fund. Using a web browser and media player, students around the world will be able to view the course online, says Schmitt.