

## IDEAS

# Liftoff for space university

**MIT plays host to first summer session of the international space program**

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"If Pravda could just see this now," comes the call from the back of the classroom. At the front stands a Soviet citizen, Vladimir Viktorovich Shutov, in an American space-shuttle suit. Mr. Shutov, a student this summer at the International Space University, demonstrates how the joints on the suit move, how the lengths of the arms are adjusted, and most important, how hot the suit gets when its cooling systems don't work.

In the classroom at the Massachusetts Institute of Technology, which has donated the space, sit 105 students from 20 countries, with backgrounds ranging from policy to propulsion systems, space architecture to satellite applications. One thing has brought them together: the dream of space.

The purpose of the nine-week program is "to educate the upcoming generation of leaders in space science and technology, and to give them a common focus for the future," says Todd B. Hawley, ISU's administrator and co-founder. Mr. Hawley's specialty is space policy.

Peter H. Diamandis, ISU's other co-founder and the director of the summer 1988 program, sees ISU as accelerating "humanity's move into space on a permanent basis," by forging bonds today between the space leaders of the future. Mr. Diamandis is pursuing a PhD in aerospace engineering at MIT and an MD at the Harvard Medical School. He holds a patent on a machine that would make it easier for astronauts to sleep in space.

While some of the students have been in the space industry for years, most are still pursuing advanced degrees or have recently graduated.

"As a physician," says Ronald Schaefer of the Straub Hospital in Honolulu, "I'm interested in bone demineralization and the deconditioning of muscle fiber in space." With extended stays in space, he said, bones become brittle and muscles weaken. At ISU, Dr. Schaefer has had the chance to learn much more about the problem than has been published in the literature, he says, by speaking with people who have worked with astronauts. He is applying to be a mission specialist on the space shuttle.

Every student attends every class: 240 hours in total. A typical day might include lectures on Japan's space policy, how to maintain an environment inside a spacecraft, an introduction to satellite applications, and an overview of the moon's natural resources.

"They are overloaded with tremendous amounts of material," says Lawrence Kuznetz, one of ISU's 30 faculty members, two of whom



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have been in space themselves.

After classes, students work on the summer's "design project": developing a complete plan for a self-sufficient, international moon base. Groups are exploring nine areas of concern, from policy to operations to space manufacturing.

Lecturers are drawn from the world space establishment, including the European Space Agency, the Soviet Cardiology Research Center, and the International Telecommunications Satellite Organization. Last week, D. Stuart Nachtwey, who manages NASA's Radiation Health Research Program, described the agency's guidelines for exposure of astronauts to radiation and told how they are expected to change in the next few years.

"When you design your moon base," he said, "you should take the new standards into account." The standards affect not only the construction of the base but also the amount of time that workers can stay on the surface of the moon.

Dr. Nachtwey applauded ISU's goal of building an international network of space leaders: "The contacts they make here are going to start paying off," he said. "This has been my experience in the past: face-to-face exposure means I can just call someone up and have a good interaction. And good interactions lead to progress."

Frank Owens, deputy director of NASA's educational affairs division, also sees the networking as a key issue: "International cooperation is a vital element in the US space program, and we are happy to see that environment as an integral element of ISU."

Lecturers walk

a difficult line between providing highly specific material for the third of the class familiar with any particular subject and general material for the remaining two-thirds, Dr. Kuznetz says.

"They try to keep the lectures general so that everyone, especially the people from policy and law, can keep up," says Derek Parker, from the University of Southern California. More detailed information can be obtained one on one with the teachers: "We have a lot of access: We eat lunch with them, eat dinner. You can get any question you want answered." Mr. Parker is studying how human movement can be applied to robotics.

In addition to access, each speaker brings a veritable book of notes, which are distributed at the back of the classroom for students to study on their own. Kuznetz's lecture on spacesuits was accompanied by an 80-page study, "Space Suit Systems: Requirements and Design Manual."

"They teach us very well," says Vadim V. Krilov, from the Moscow High Technical School. "Only a little writing at the desk." In Moscow, "The main idea and purpose is to teach us to write at the desk. We haven't the slides and films," or the machines to allow the luxury of photocopied notes, he said.

"I learned a lot. Even though I had a broad knowledge before, now it's deeper," says Dr. Claudia Lundberg, a life scientist who works for the German Space Research Agency.

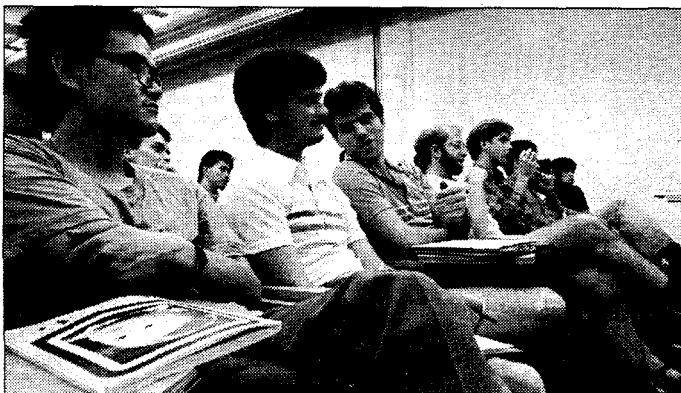
The nine-week program costs \$10,000; all the students have partial or full scholarships. The space university itself has been granted more than \$1 million from governments, corporations, and foundations all over the world.

ISU will be in a different country each of the next four summers. Next year's location will be either France or Germany, Hawley says. In 1992, the school will touch down and establish a two-year master's program at some semipermanent location.

But Hawley believes that the ultimate home of ISU will be off-planet: "When there is an active research program on the space station, ISU should have facilities, faculty, and even students, where appropriate, on board."

**Larry Kuznetz (left) lectures on American space-shuttle suit design as Soviet student Vladimir Shutov models one**

INTERNATIONAL  
SPACE UNIVERSITY  
**ISU**



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Future space walkers and builders: ISU session drew students from 20 nations