WSU offers space science graduate program

Wichita State University is offering the first-of-its-kind-in-Kansas Space Science Graduate Certificate program.

The global private space sector is a $108 Billion per year industry. And is expected to grow 100-fold over the next ten years with the onset of asteroid mining, space tourism and expanded space defense activities. There is a growing demand for those with specialized knowledge and experience in space science.

This 18-credit hour Space Science Certificate Program is not about astronomy, according to Nick Solomey, program director. It is about operating and getting space equipment into space and the special things one needs to do to function in space. Some astronomy is included, but is not the focus.

“It is not trivial to operate equipment in space,” said Solomey. There’s high plasma levels and nasty radiation. We need protection. Spacecraft needs complicated subsystems to provide the correct operating environment to the science payload.

Currently there are only 18 schools in the U.S. offering Space Science Graduate Certificates. Originally, the first six universities with such programs were located right outside NASA Centers. Once the private sector got involved in the space business other universities, such as the University of Arizona or Emory University, developed centers.

“What we have going for us in Kansas is our manufacturing and aviation base which could [easily slide] into aerospace with space connections,” said Solomey.

One of the biggest needs being addressed with this graduate program is the interdisciplinary flavor, according to Atri Dutta, assistant professor of aerospace engineering. “Success in a space mission requires tacit coordination among different scientists and engineers. Students get that flavor during this graduate program.”

“The program provides a unique combination of science, engineering, policy-related and astronautics courses,” said Dutta.

“On the engineering side, the core course on astrodynamics is standard, while the course on nano-satellite engineering is unique in that students get hands-on experience with nano-satellite kits in class.”

Also unique is the ethics of space exploration course. WSU is one of only a dozen universities worldwide with a faculty member specializing in this area. “The simple fact is that ethical questions pervade the practices of space science and engineering,” said James Schwartz, assistant professor of philosophy.

Besides empowering students [we think] this could help grow the economy in Kansas, especially the aerospace industry, with the rapid growth of space in the private sector,” said Solomey.

The idea for this graduate certificate program has been fermenting in WSU’s physics, aerospace engineering and philosophy departments for several years. With the encouragement of Dr. Andrew Hippisley, Dean, Fairmount College of Liberal Arts and Sciences, it has been brought to fruition and will begin classes in the fall of 2020, according to Solomey.

Robots to expand distance learning

MANHATTAN—Robots will help expand learning opportunities to Kansas rural schools, thanks to a grant awarded to the Rural Education Center at K-State University.

The USDA award is a $146,031 Teaching Rural Students STEM Through Telepresence Grant to create a distance learning network.

The initial eight districts participating are Ashland, USD 220; Clay Center, USD 379; Dighton, USD 482; Haviland, USD 474; Lakin, USD 215; Liberal, USD 480; Pratt Skyline, USD 438; and Bennington/Tescott, USD 240.

This is part of the USDA’s $42.5 million initiative in 2021.

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KANSAS OBSERVATORY RESOURCES

This information was gathered prior to the COVID-19 crisis and events are subject to change.

**BANNER CREEK** Science Center and Observatory, Holton, has a PlaneWave 24-inch CDK mounted on the L 600 direct drive mount. This will be available remote operations in August, 2020. The observatory also conducts open houses for visual observation and CCD imaging. Group events can be scheduled.

**CRANE** Observatory—Opened in 1901, the Crane Observatory is currently located in the Stoffer Science Hall on the Washburn University campus, Topeka. Its unique Warner and Swasey refracting telescope was built in the late 1800s. The observatory schedules open houses for the public.

**EARL BANE** Observatory—Opened in 1997, it is on the campus of Cloud County Community College in Concordia. Its 12-inch Catadioptric telescope has a magnification power of 600, allowing for deep space observations. Star parties are held regularly. Open to the public.

**FARPOINT** Observatory—A private observatory in Eskridge, it belongs to the Northeast Kansas Amateur Astronomy League (NEKAAL). NEKAAL holds public observing sessions from March to November, and for special sky events. Astronomy presentations can also be done on request, free of charge.

**LAKE AFTON** Public Observatory—Located southwest of Wichita, LAPO is staffed by Kansas Astronomical Observers (KAO) volunteers, who reopened the observatory in 2016. The centerpiece is its 16-inch Ritchey-Chretian telescope paired with a 6-inch refracting telescope for wide-field observations and photography. Upgrades also include new control software, interactive exhibits and computer astronomy and science stations. Each year, LAPO hosts an AstroFest event in July. Open Friday and Saturday nights during the summer with observing and programs. Fee.

**MABEE** Observatory—Opened in 2002, it is located on top of Krehbiel Science Center on the Bethel College campus in North Newton. It has a 16-inch Meade LX200 GPS, recent upgrades have been made to the imaging capabilities. It has a SBIG 16803 camera with filter wheel and adaptive optics. The dome has also been automated to track the telescope. All this should enable use for research purposes and teaching of scientific imaging. Currently no public events are scheduled, but are likely to be planned.

**POWELL** Observatory—Powell Observatory is a private observatory 25 miles south of Kansas City, just north of Louisburg, Kan. With its 30-inch diameter mirror, the Ruisinger telescope is one of the largest telescopes available for public viewing in a five-state area. Public programs are on Saturday nights, May thru October. A donation is requested. Offsite outreach is available year-round. Owned by the Astronomical Society of Kansas City (ASKC), over half of its 425 members live in Kansas.

**PITTSBURG STATE UNIVERSITY-GREENBUSH** Astrophysical Observatory—(PSU-GAO)

Opened in 1997, the observatory is a cooperative effort between Pittsburg State University, the Southeast Kansas Education Service Center, Craw-Kansas Telephone Cooperative and numerous school districts. The 24-inch Cassegrain telescope and other research equipment came from New Mexico State University where its specifications and installation had been overseen by Clyde Tombaugh in 1967. Open houses and programs are free. PSU uses it for research. Located about 20 miles northwest of Pittsburg.

**Fourteen presentations from the Sixth Interstellar Symposium and Interstellar Propulsion Workshop in November are now online at: TVIW**

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million investment in 133 distance learning and telemedicine projects in 37 states and two U.S. territories. In Kansas, the grant is expected to serve 2,360 rural students and 37,964 rural residents.

The funds—used solely on equipment for the schools—will buy 36 Double Robotics robots, which allow educators to teach and interact with students who are at a different location. The schools will also receive Apple iPads and laptops, as well as other equipment necessary for the project.

“We chose Double because of their size and mobility, as well as their ability to move and zoom the camera on student work. We feel like this distinguishes telepresence from normal broadcast classes,” said J. Spencer Clark, Rural Education Center director.

Besides helping in teaching STEM courses, having guest speakers or events, and teacher professional development, it also may help address teacher vacancies in rural schools. Total vacancies in the state as of Fall 2019 were around 800, according to Clark.
This “Interstellar R&D” thirty-seventh feature in the Ad Astra Kansas News these past 19 years continues an enterprise to research and gather information on important developments preparatory to humanity’s greatest adventure—voyaging to the stars. Now, at the millennium’s turn, is an appropriate time for grand vision and forward thinking, and there are strong signs of a renaissance in interstellar travel thought and activity. This feature and newsletter, thus, now set forth to develop a national/international/global clearing center and storehouse of knowledge and know-how for travel to the stars: Ad Astra—Galactically, Steve Durst.

Observation

Interstellar University To Advance Astrophysics As Well As Astronautics

A considered Interstellar University (IU) in the Ad Astra State of Kansas should include astronomy, ‘the king of sciences’, in its curriculum along with classic interstellar disciplines such as astrodynamics, astromaterials research, starship design and construction, propulsion, and relativistic travel and more.

Astronomy in Kansas reflects a natural uplooking manner in a state whose motto “Ad Astra Per Aspera” has been a cultural foundation since Kansas became the 34th star on the USA banner on January 29, 1861. Ad Astra Kansas Foundation President Jeanette Steinert confirmed that Kansas astronomy tradition in her opening remarks at the Interstellar TVIW / NASA Symposium in Wichita in November 2019.

IU astronomy / astrophysics studies relevant to and enabling interstellar astronautics and mission design may inspire creation of such study, working groups and commissions within the American Astronomical Society and the International Astronomical Union, such as “SETI Advanced by Starship”.

An announcement of the official-founding of the Interstellar University is planned in Topeka on January 29, 2021, 160 years to the day of Kansas statehood—possibly accompanied by a proclamation from Kansas Governor Laura Kelly, and by science/astronomy ceremonies in Topeka. The first IU course(s) may be on Ad Astra Kansas Day, April 24, 2021.

Communication

Tennessee Valley Interstellar Workshop (TVIW) and NASA held the 6th Interstellar Symposium and Advanced Interstellar Propulsion Workshop in Wichita, KS, in November 2019. Wichita State University and Ad Astra Kansas Foundation also helped organize this workshop, which focused on propulsion using beamed energy, fusion and antimatter. In June 2020, Phil Lubin (UC Santa Barbara), David Messerschmitt (UC Berkeley), and Ian Morrison (Curtin University, Australia) updated their NASA Starlight publication on communication downlinks from low mass interstellar probes, “Challenges in Scientific Data Communication from Low-Mass Interstellar Probes.” Their update discussed new technologies for interstellar communication, including: (a) Better optical compression and low-mass light sources in transmitters or receivers. David Fields (TVIW) helped design five algorithms for receivers. (b) Improved low-mass transmitt aperture and pointing adjustment accuracy. (c) New multiprobe multiplexing to reduce inaccuracies in time, speed, and distance, including the Doppler shift. (d) Better adaptive optics in optical sub-array to counter turbulence, and star radiation and (e) Low-mass and low-power compression to counter turbulence. Messerschmitt believes electromagnetic radiation leaked from the Earth to outer space from radio and TV programs, would have traveled 100 lightyears over the past 100 years and that intelligent life in the 100 lightyear radius might detect them. Messaging Extraterrestrial Intelligence (METI) President, Doug Vakoch advocates for multi-disciplinary research on interstellar messages that would include people from astrobiology, engineering, and the arts.

Transportation

Breakthrough Starshot and NASA Starlight projects are leading international efforts to develop StarChips for Interstellar Transportation. StarChips are thousands of wafer-sized chips attached to large, silver lightsails. At launch, intense Earth-based lasers would accelerate the lightsails with a force of about 100 GW for 2 minutes, allowing StarChips to travel at .2c, propelled by high-powered pulses of photons from these ground-based lasers. At this speed, StarChips would and reach the nearest star in nearly 20 years. Starshot Executive Director Pete Worden, former director of NASA Ames, hopes to raise $10 billion for this project. Starshot plans to use quantum computing to process data returned from Alpha Centauri, 4.37 lightyears away. Quantum Computing would process data from several StarChips 100 million times faster than supercomputers. Gerald P. Jackson of Fermi Labs is developing an antimatter thruster that can reach the nearest star at 5% of the speed of light, or better. At Fermi Labs, Jackson’s team successfully developed 2 gms of antimatter per year for 14 years; their work was encouraged by Congressman Bill Forester (IL), who helped approve the antiproton Recycler ring at Fermi Labs. In 2017, Jackson started crowdfunding the design of a particle accelerator that can produce antiprotons. Details are on the Antimatter Drive website http://antimatterdrive.org.