

# Physics-Business Master's Degree

Physics graduates who want to pursue a business career, rather than follow the traditional path of research and teaching, have another route of entree—a new master's degree program at the University of Southern California (USC). The two-year

special track to provide training in one of several business fields, which include operations management, corporate finance, and information systems. Finally, the curriculum includes review of emerging technologies and a "capstone experience" that is expected to include a business-oriented internship with a local company.


Bozler says that there are some companies in southern California that will be involved both in planning the new program and in providing internships for the master's degree candidates.

As part of the planning process, the USC Department of Physics and Astronomy conducted a survey of all its alumni living in the United States. Even without follow-up, 86 of the 545 alumni (15.8%) returned their completed three-page questionnaires. Nearly

half (48%) of the respondents work for companies; 16% are at universities; 15% are employed by government; and 9% are self-employed. The remainder are retired or did not indicate current employment. When asked how well informed they had been about the diversity of careers in science, only 8% said they had been well informed; 36% said they had had enough information to choose jobs; and 54% said that they had not been informed well enough.

When asked in a free-response question what skills derived from their scientific training have proved most valuable throughout their careers, 44% named analytical and critical thinking; 16% chose mathematics and statistics; 12% mentioned the content of their physics and science courses; and 7% said computer skills. When asked in another open question what they felt they should have studied in addition to science, 35% volunteered business; 15% named computers; and 11% said social science. Math, engineering, law, and foreign languages each garnered a mention by 5% to 7% of the respondents.

Recruitment for the USC physics-business master's program is scheduled to begin this fall, and the first students are expected to start classes in the fall of 1999. The school's goal is to enroll 20 students. "We hope to

attract recent graduates who perceive the need for more specialized business training, as well as those already in commerce, government, and industry," says Bozler. More information is available at [www.usc.edu/dept/physics/SloanWeb](http://www.usc.edu/dept/physics/SloanWeb). 

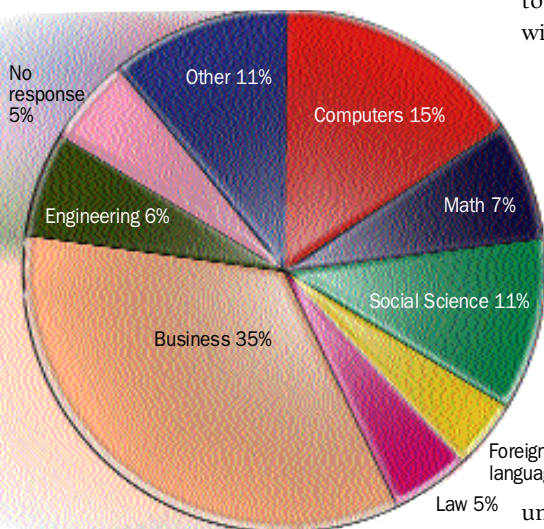
## Infrared Connections

Cables, undoubtedly, are the messiest part of desktop computers, workstations, and even instruments in the laboratory. Although wireless connections have been on the drawing board for about a decade, cable-free products have begun to enter the marketplace only recently. And the driving force for developing wireless connections, it turns out, is not the desire of computer users to rid their lives of cable clutter, but rather the need to easily and quickly connect notebook and laptop computers to office-computer systems.

Using cables to connect computer peripherals remains so much a mindset that other ways of making the connections usually get no consideration except for new products. For instance, when cordless pens for drawing and drafting programs were introduced a few years ago, they were eagerly purchased. Cordless versions of established products such as keyboards, mice, and trackballs, however, have yet to gain a measurable share of the market.

Two technologies—infrared and radio-frequency—are contending for the wireless-connection market. Infrared technology, even though it is limited to short-range operation, has taken the lead because companies worldwide have made a concerted effort to develop working standards for wireless infrared connections. Radio-frequency wireless, on the other hand, generally remains at a free-for-all stage of development.

The most ubiquitous and familiar infrared wireless device is the remote controller for TV sets and VCRs. Companies originally involved in developing standards and protocols for infrared data transfer took note of the features that have made the TV "remote" so successful; namely, it is simple to use, very reliable, and inexpensive. They formed the Infrared Data Association (IrDA) in 1993



### If you were back in school, what would you study in addition to science?

Physics for Business Applications program is also open to graduates with a bachelor's degree in applied mathematics or a physical science, such as chemistry, electrical engineering, and aerospace engineering.

The physics-business program is being developed with a grant to USC from the Alfred P. Sloan Foundation, which is funding the development of professional master's degrees in the sciences. "We expect the 'physics plus' degree to be comparable to MBA and law degrees, but grounded in the tools and techniques of advanced technology," says Hans Bozler, USC professor of physics who heads the Sloan-funded effort. Two other professional master's degree programs—computational biology and environmental science and technology—are also being developed at USC under the terms of the Sloan grant.

The curriculum for the physics-business program consists of three parts. The first is a core of physics courses intended to enhance skill levels in basic science. The second is a

and in less than a year published the specifications for the Serial Infrared (SIR) link, along with its protocols, to ensure infrared compatibility with PC serial ports.

Today, IrDA (Walnut Creek, CA; [www.irda.org](http://www.irda.org)) has more than 160 members engaged in developing and supporting the hardware and software standards needed to make infrared a universal means of wireless data transfer. IrDA is not only targeting computers, peripherals, and local-area computer networks for its standards, but it also is developing standards for digital telephones, digital cameras, TV set-top boxes, electronic games, home appliances, and business applications such as field service, warehousing and distribution, and manufacturing.

The latest IrDA standards cover bidirectional command and control. The first devices using IrDA Control are expected to be multimedia PCs and two-way set-top boxes that make the home TV set capable of interactive television and connecting to the World Wide Web. Up to eight input devices can simultaneously communicate with two or more host machines. Infrared offers the advantages of low-cost components, low power requirements, and high immunity to interference; furthermore, it does not generate electromagnetic noise that may interfere with electronic systems. A high-speed (up to 4 Mb/s) transmitter-receiver unit consists of an infrared-light-emitting diode, a photodiode, and an amplifier integrated circuit. Future opportunities include the development of components and software for wireless data transfer to and from instruments and equipment used in scientific research and development. In the lab and on the shop floor, the future may yet be cable-free. □

### — Updates —

**R**esearchers continue to find novel applications for aerogels, the extremely lightweight, porous materials formed when all the liquid from a gel is rapidly removed (see *The Industrial Physicist*, 9/97, p. 13). Starting with a surfactant technique for making a “mesoporous” material from a gel, discovered by Mobil Corp. scientists in 1992,

researchers at Sandia National Laboratories (Albuquerque, NM) have developed a method of producing “mesopores”—uniform, molecule-size pores—in a silica-aerogel membrane. The membrane is less than 1  $\mu\text{m}$  thick, and the size of the uniform pores can be controlled by the production process. These porous membranes are suitable for screening gas molecules according to size. Initial applications most likely will be in detectors for nerve gases, insecticides, and herbicides. Sandia also is investigating other applications such as gas separation, purification, and catalysis.

At Nanopore, Inc. (also in Albuquerque, NM), another group of researchers has teamed up with Texas Instruments (Dallas, TX) to investigate the use of a “xerogel” developed by Nanopore that may be nearly an ideal insulator for wires in integrated circuit chips. TI has combined the xerogel technology with a new technique developed by IBM that replaces aluminum wires in integrated circuits with copper, a better conductor. According to TI, xerogel could insulate a mile of wire crammed into an integrated circuit the size of a fingernail. The result is a manufacturing technology that may result in a tenfold increase in microprocessor speed. The research is supported by the National Institute of Standards and Technology’s Advanced Technology Program.



**I**n spite of successfully demonstrating its flywheel-turbine power train for automobiles (see *The Industrial Physicist*, 12/97, pp. 15–16), Rosen Motors has closed its doors. According to founder Benjamin Rosen, who put more than \$20 million into his start-up effort, “The company failed to meet its goal of having a major automobile manufacturer invest in our company and commit to developing our power train.” Some reports, however, suggest that Rosen suffered reverses in the stock market and was forced to consolidate his remaining assets. Rosen Motors’ subsidiary, Capstone Turbine Corp. (Tarzana, CA), employing about 120 people, will continue to market flywheel-turbine systems for electrical-power generation. □