

# WORKFORCE of tomorrow



## SoCal Hybrid Optics Program Is “Just Right”



As the need grows for engineers and technicians with photonics training, schools and colleges have been unable to keep up with the demand. In many cases, the cost of starting or maintaining a program is prohibitive, especially considering fluctuating employment needs and shrinking state budgets.

One solution is distance learning, using technology to bring education to anyone, anywhere, at any time. Using video, discussion forums, chat, Web conferencing and freely available animations and applets, courses can be delivered without commutes to a physical classroom. Optics is easily demonstrated as well – as anyone who has made a graded-index lens out of gelatin will agree – which allows students to perform hands-on experiments in their own homes with inexpensive materials. – Judy Donnelly, column editor

**Once upon a time** in Southern California, an optics education program set up shop in temporary classroom space at a community college with the goal of preparing trained graduates to fill critical open positions in the optics industry. The program soon outgrew its original mission, expanding into two University of California Irvine Extension certificate programs for engineers and others looking to grow their skills and employment options. And it outgrew the physical classroom space, too, adding options that would allow students to participate online and live via an application called WebEx.

“The main reason we have this program at all is [because] the local industry in Southern California was hurting – it was losing business because they weren’t able to get employees with these skills,” said Donn Silberman, the founding advisory board member, current chair, instructor and force behind the school’s Optical Engineering and Instrument Design cer-



tificate programs. By day, Silberman is a senior applications engineer at PI (Physik Instrumente) in Irvine, where he assists engineers and scientists in choosing the best precision positioning systems for their optical instruments.

While it isn’t easy to estimate the number of trained graduates the industry will need year to year, Silberman believes the number will vary quite a bit based on many factors, including which of the many industries using optics and photonics are growing or shrinking. “The good thing about having skills and education in optics and photonics is that they can be used in many industries,” Silberman said. “They are very transferable.”

He and his team are talking with four-year college students about adding optics to their arsenals going forward in their careers. “We say to them, you have an engineering, math or physics background. Why don’t you learn about optics, too?”

Silberman and several associates, including other instructors and advisers from industry, have written and presented papers on various iterations of the program over the years, most recently at SPIE’s Optics & Photonics event in August (SPIE doi: 10.1117/12.928814).

Their motivation is simple: “We want this industry to succeed long-term. Optics

**“We say to [students], you have an engineering, math or physics background. Why don’t you learn about optics, too?”**

– Donn Silberman  
University of California Irvine Extension

technology is such a big part of everything we do,” Silberman said.

The latest paper focuses on teaching methods introduced over the past couple of years. Today, the programs are a hybrid solution serving the needs of students not only in the Southern California region, but from across North America and beyond.

With heavy traffic creating hour-long commutes for many current and prospective students in Southern California, Silberman and colleagues suggested tapping into the extension’s already successful online distance education programs, bringing a slight twist to the optics courses: The new programs would have instructors in the classroom with some students, while other students would participate live online via WebEx. In addition, the lectures would be recorded and accessible on demand by all students.

The team had several reasons for recording the live lectures: The rapid pace of lectures made it difficult for some students to keep up with the class, and instructors’ answers to students’ questions often were delivered too quickly for note-taking. Further, being able to review notes and pause or replay part of a lecture could help students better understand and remember the course material.

Along with new instructional methods comes the need for new teaching tools. Besides WebEx, webcams and “extensive

# WORKFORCE of tomorrow

IT support from UC Irvine Extension's Instructional Technology and Distance Learning Center staff, along with network licenses for optical and mechanical software tools," have become essential to the programs, the group reported.

Geometric and physical optics courses also make use of online teaching methods: A web page has been set up for each course, recorded lectures can be accessed by both Flash and SmartPhone applications, and additional online materials include links to other websites, Java applets and more. Instructors can employ the live webcam to display notes used to answer students' questions. Hands-on lab assignments and instructors' weekly office/lab

hours also are handled online, according to the report.

"We are sticklers for hands-on work, especially in optics," Silberman said. "For the introductory class, we needed a low-cost optics kit for education." Using items mostly from Edmund Optics, plus a Galileo telescope, the whole kit costs just under \$150 including the \$50 telescope with two lenses. A similar set of experiments was created for the physical optics course that includes low-cost diffraction gratings, polarizers, light sources and detectors, the paper noted.

Silberman's co-authors on the latest paper were T. Scott Rowe of Rowe Technical Design in Dana Point, Calif.; Joshua

S. Jo of Syprosoft Engineering in Irvine – both instructors – and David Dimas of UC Irvine Extension. They acknowledge the vast support they have received from the UC Irvine Extension staff and, "most importantly, their Instructional Technology staff and Distance Learning Center (DLC)."

Silberman believes that the program can be easily emulated, which is why he wrote and presented the paper about it. "I think a determined leader, dedicated instructors and a fantastic college staff are needed" to accomplish what they have in Southern California, he said.

Karen Newman

karen.newman@photonics.com

## Excited about optics

### The University of California

Irvine Extension honored Donn Silberman with the Dean's Outstanding Service Award at its 13th annual Instructor and Advisory Committee Member Appreciation Breakfast in November. The award recognizes an individual who has proved to be an invaluable resource to UC Irvine Extension. Silberman received the award for his contribution as a founding advisory committee member of the Optical Engineering and Optical Instrument Design certificate programs. His efforts have helped UC Irvine Extension recruit high-quality instructors and

offer program participants industry-leading courses, the university said.

In December, Silberman, a University of Arizona Honors College alum – he graduated in 1983 with a BS in engineering physics with honors in physics – received that school's 2012-13 Advocate for Education Award and gave a keynote presentation for winter graduates titled "What Is Light?"

Not one to rest on his laurels, Silberman has embarked on a new crusade aimed at getting kids excited about optics and robotics. In his latest adventure, as he puts it, Silberman has coined

a new word – optobotics – for which he is seeking trademark protection, and he has secured a grant from SPIE to prepare kits and "get things going."

He has already begun getting the word out through a number of local events, including a short demonstration for colleagues at a meeting of the Optical Society of Southern California, and a live optobotics presentation at the UC Irvine Beall Center for Art + Technology Family Day event in November, which he said was well received. In December, he presented a webinar sponsored by the UCI program titled *OPTOBOTICS – Precision Motion for the Optics Age: A Look Around the Martian Surface*.

Silberman is happy to share his thoughts on how the industry can get involved and improve its chances of finding skilled workers ready to fill job openings as it continues to grow. That's why he does what he does, he said. "We have to get students excited about optics, and before they can get excited about optics, they have to be introduced to optics in ways that encourage them to think about including optics and photonics as career opportunities."

Soon, he said, the new optobotics projects will gain momentum as programs are developed and they can show successes in reaching out to students. "We hope others will follow our lead and incorporate themes that get students excited about optics."

