

BRINGING SCIENCE ALIVE



Bob Goldberg

by Stuart Wolpert

WHEN NEWSWEEK'S COLLEGE GUIDE WROTE AN ARTICLE TITLED "IN SEARCH OF GREAT PROFESSORS," ABOUT THOSE WHO CAN "CHANGE YOUR LIFE FOREVER," UCLA LIFE SCIENTIST BOB GOLDBERG WAS THE FIRST PROFESSOR PROFILED. WHEN THE DAILY BEAST SELECTED "AMERICA'S 10 HOTTEST CLASSES," THERE HE WAS AGAIN, IN AN ARTICLE THAT NOTED GOLDBERG "HAS BEEN LAUDED ON MANY OCCASIONS FOR BEING ONE OF UCLA'S BEST TEACHERS." HE HAS RECEIVED MANY TEACHING AWARDS, INCLUDING A HOWARD HUGHES MEDICAL INSTITUTE AWARD TO IMPROVE UNDERGRADUATE EDUCATION.

Now he is sold on the idea that students can receive a first-rate online educational experience, if it is done right. "We brought science alive online," said Goldberg, who has taught innovative courses for many years. His students share the sentiment. "Dr. Goldberg is an extraordinary teacher who cares deeply about his students and their learning process," said Tyler Cherry, a second-year UCLA political science major who took the online course. "I learned the basic ins and outs of genetic engineering and the role that genetic engineering technology plays in society today. More importantly, however, I learned of society's need for and benefit from genetic engineering."

"Taking Dr. Goldberg's course on genetic engineering opened my eyes to the many practical, useful discoveries that have been made possible by the advent of biotechnology," added Lilit Arabyan, who has now graduated from UCLA as a political science major. "Such things as decreasing the likelihood of diseases among infants are made possible through genetic engineering. The entire course was an absolute success, from start to finish. The format of the online course was designed to allow maximum interaction between the student, Professor Goldberg and his excellent teaching assistants. This was my last course at UCLA as an undergraduate, and it was a great way to end my undergraduate career."

"I was very impressed by the quality of the lectures, and I'm a visual learner, so I found the accompanying animations incredibly helpful," said Anne Schneider, who has now graduated from UCLA as an architectural studies major and is working as an architectural designer in San Francisco. "While I learned a lot of 'hard science' during the class, my takeaway was about society's complex relationship to genetic engineering. From health care to criminal investigations to the food we eat, there's almost no aspect of our lives that isn't affected by genetic engineering. This class assuaged a lot of my fears regard-

ing that and especially regarding genetically modified foods."

In high-definition video conferences, Goldberg called on students by name and asked them to explain and defend their views—which he already knew from reading their paragraphs. He gave each student two oral exams.

The vast majority of his students are UCLA undergraduates, but many participated from summer trips to New Delhi, Shanghai, Cairo, New York, San Francisco and elsewhere.

Better Learning Through Video

GOLDBERG'S LECTURES WERE ANIMATED with hand-drawn illustrations of the concepts he explains. The class included videos and tutorial sessions in which Goldberg and the students could see and hear one another, as well as filmed experiments and scientific demonstrations in his laboratory. It also included guest lecturers and interviews Goldberg conducted with experts such as the head of the Los Angeles Police Department's DNA Unit and experts on stem cells, in vitro fertilization and genetic testing, and genetic engineering of foods in the developing world.

Goldberg, a member of the National Academy of Sciences and a fellow of the American Association for the Advancement of Science, covered a wide range of genetics and genetic engineering issues, from how genes work to sequencing the human genome, genetic testing and DNA fingerprinting, ethical issues surrounding genetic engineering, and how genetic engineering has

affected our lives and society. The course was similar in content to Goldberg's popular Honors Collegium course "Genetic Engineering in Medicine, Agriculture and Law."

"Using the independent filmmaker's approach, we produce lecture videos that have beautiful lighting, excellent sound and are edited in the style of a Ken Burns documentary," O'Connell said. "Our web interfaces are simple and elegant. We like to think of ourselves as the Mac of online higher education. Every professor is a storyteller. Online or in the classroom, their goal is to communicate and inspire."

O'Connell and his team use carefully conceived animations to make concepts easier to grasp and processes easier to follow. (For more information, go to <http://www.online.ucla.edu/>.)

"The animation makes the material so clear," said Goldberg, whose current

teaching is funded by the National Science Foundation Plant Genome Program. "I don't care if you're the best lecturer on the face of the earth; you still can't make the ideas come alive as well as Raoul and his TFT team can."

Brian Copenhaver, who holds UCLA's Udvar-Hazy Chair of Philosophy and History and is former provost of UCLA's College of Letters and Science, worked with O'Connell on an online version of his course "Historical Introduction to Philosophy."

"Bob is a brilliant scientist and a world-class teacher. I knew that he would be a great match for Raoul and the TFT team, who are equally dedicated and creative," said Copenhaver, who recommended that Goldberg and O'Connell work together.

"It's been a tremendous amount of work and took more energy than my normal classes," Goldberg said. "I was happy to do it."

AND LAST SUMMER, Goldberg taught a remarkable online course titled "Genetic Engineering and Society." Offered through UCLA Summer Sessions, it's a Life Sciences general education course designed for non-science majors.

From Skepticism to Enthusiasm

GOLDBERG ADMITS WHEN HE WAS FIRST APPROACHED ABOUT THE IDEA, he had no trouble containing his enthusiasm.

"I was very skeptical," said Goldberg, UCLA distinguished professor of molecular, cell and developmental biology. "I didn't believe in the online learning experience. Many online courses just film a class and put it online; my view had been that it's education-on-the-cheap if it's not done right."

Then he got to work with a talented group led by Raoul O'Connell, Director of TFT Online, a unit of the UCLA School of Theater, Film and Television in which filmmakers, programmers and multimedia professionals produce innovative, technologically sophisticated online courses.

"They're phenomenal, so committed to educational excellence," Goldberg said. "They're the most creative people I've ever come across in education."

The 50-Paragraph Approach

THE 50 STUDENTS IN HIS COURSE had frequent interaction with Goldberg and his teaching assistants, who are outstanding former students of his. When the students watched his video lectures, they were required to stop watching more than 50 times and write a paragraph before watching more. Goldberg would ask them, for example, "Describe a simple experiment that tests whether DNA is the genetic material" and "What do you think about a business patenting your genes?"

