

BaylorNews

Monthly News for the Baylor University Community

Mapping the Future of Health Care

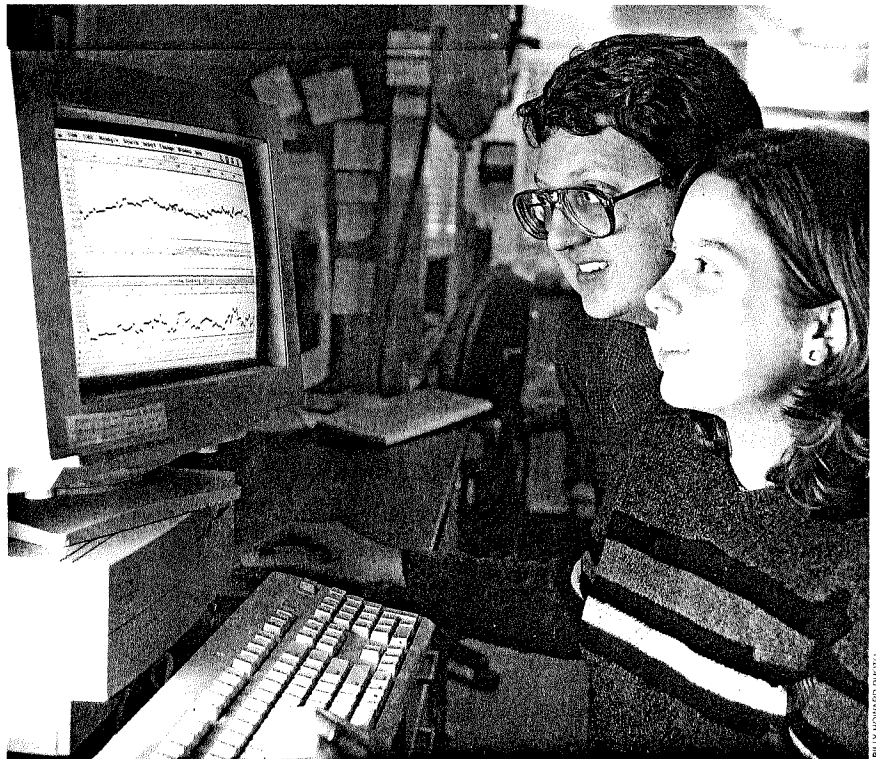
Baylor's bioinformatics students have their work cut out for them in helping to decipher human genome data

By LoAna Lopez

Ten years after the Human Genome Project began mapping the genetic DNA code of human chromosomes, scientists have nearly completed a working draft. Estimates are that by 2003 or sooner, the sequence will be finished. While that will be a groundbreaking accomplishment, navigating this genetic map will occupy researchers and scientists for years to come.

Baylor's bioinformatics students are preparing to take on the role of helping facilitate this genetic research. They have been at the forefront of this new technology since the degree program began in fall 1998, making Baylor one of the first universities in the world to offer an undergraduate degree in bioinformatics, an interdisciplinary curriculum blending computer science and molecular biology. As of April, 1999, other universities to offer undergraduate degrees in bioinformatics are Bielefeld University in Germany; Rensselaer Polytechnic Institute in New York; Universität Tübingen in Germany; and Ben-Gurion University of the Negev in Israel.

These bioinformatics graduates will have their work cut out for them. Analyzing the human genome is expected to unlock a plethora of life's phenomena, including susceptibility to disease, the workings of cells and the functions of proteins. The implications for improved health diagnosis and care are extraordinary.



Dr. Greg Speegle and a student analyze data on genome sequencing.

"The mapping of the human genome is almost complete, but no one really knows what the information means," said Dr. Benjamin Kelley, dean of the School of Engineering and Computer Science. "This is the very tip of the iceberg."

Dr. Greg Speegle, associate professor of computer science, said strides in the completion of

the human genome sequence are the beginning of a much bigger feat. "In a way it's a milestone, but it's like seeing that first mile marker in a marathon," Dr. Speegle said. "We know what the basic things look like, but what do they mean? That really will be the wealth of information that people will get. That's where

Bioinformatics Degree One of First Offered in World

continued from page 1

using this genetic information will become important, in things like finding cures for diseases."

Of course, that goes hand-in-hand with Baylor's history of excellence at the undergraduate level in health-related fields of study and the University's mission to educate men and women for service to others.

Health emphasis

"The bioinformatics program fits well with Baylor's traditional emphasis in the health sciences," said Dr. Ben Pierce, professor of biology and associate dean for sciences in the College of Arts and Sciences. "It is clear that there are genetic differences in susceptibility to various diseases and disorders and in how one responds to treatment. In the future, we will be able to take these differences into account and tailor treatment to a patient's unique genetic makeup."

Much of the Human Genome Project is aimed at gaining knowledge that could directly improve diagnosis and treatment of patients with various chronic illnesses and application of preventative medicine and medication, among other things.

"Once they have all the information on the linear DNA sequence, then there will be the protein structure to analyze, then the function of that protein in the cell and the body, and then modifications of the sequence to learn more about the protein's function" said Dr. Chris Kearney, assistant professor of biology. "It's just the beginning. The end goal is a total knowledge of the human body from gene to cell to whole body."

All of these discoveries will open doors to further research. It is a burgeoning career field, and Baylor's foresight in implementing the bioinformatics degree was prescient.

"Within today's knowledge society, the bio-economy is rushing to take its rightful place in alongside the information and electronic business," Dr. Kelley said. "It's no wonder that several of Baylor's technology-based academic powers — computer science, biology, chemistry and biochemistry — were among the first to integrate an innovative undergraduate bioinformatics program."

Baylor's degree in bioinformatics was developed jointly by the biology and computer science departments and is awarded through the School of Engineering and Computer Science. The curriculum combines computer science and molecular biology to create a broad, interdisciplinary degree applicable to a variety of career opportunities. Students who graduate with a degree in bioinformatics can work with the Human Genome Project, but they also will have other opportunities, including research or continuing on to medical school, to name a few.

Essential skills

"I think it's very likely that in the next 20 to 30 years, computers will be such an integral part of all that we do, that the informatics person who has education in computer science and something else will be essential," Dr. Speegle said.

Dr. Kearney agreed that a career in the Human Genome Project is only one way to use a bioinformatics degree. "I

would say most students going into medicine or most of the laboratory biological sciences are going to have to become a hybrid of a biologist and a computer scientist to some degree."

At Baylor, students are not merely signing up for computer science and biology courses. Dr. Speegle explained. The program is designed to give students a specialized approach to combining two disciplines.

"What's distinctive is that bioinformatics primarily is interdisciplinary and it's specifically tailored for students who are interested in this combination," Dr. Speegle said.

"The courses selected from computer science and biology are designed to have students know how to combine the two in the workforce. They're not just taking a bunch of biology and a bunch of computer science.

"This is a very demanding program. But it's a win-win situation for the company who is able to hire a student right out of school, and for the student who may then get more education while working for that company."



Dr. Chris Kearney studies a film of DNA sequencing.

BILLY HOWARD PHOTO

the nation's largest philanthropic organizations, recently awarded Baylor a \$500,000 grant for the purchase of top-line laboratory equipment that will enrich these two fast-growing undergraduate science majors.

Some of those funds will be used on laboratory equipment specifically for the advanced database course, giving bioinformatics students experience in research directly related to the Human Genome Project.

"In the past, there was one big project at the end of the course that was business-related," Dr. Speegle said. "Starting in spring 2001, this senior capstone course also will feature a big project that is designed specifically for genome research. We'll have plenty of resources for students to conduct very realistic research in bioinformatics."

Strengthens reputation

Because Baylor is on top of current scientific research and developing programs to prepare graduate students who will be knowledgeable and in demand, the University's reputation for excellence in health-related undergraduate studies will continue to be strengthened.

"We're at the forefront of research and we can offer an excellent education in undergraduate bioinformatics," Dr. Kearney said. "With a mission toward helping people, I think Baylor has a unique role in being concerned with the character of its students. In this way, we're also adding to the Baylor's academic caliber. The bioinformatics program also adds to Baylor's reputation because we are sending out students who are in demand."

There are about 70 students in the bioinformatics program, Dr. Kearney said. Fifteen students started the program when it was introduced, and the numbers have continued to increase. Most of those first-year students will take their capstone course — advanced database — in the spring semester with Dr. Speegle.

He and Dr. Kearney are developing that course and recently received a boost for their efforts when they were awarded a grant that will benefit both bioinformatics and biochemistry.

The W.M. Keck Foundation, one of