

H A R V A R D P O R T R A I T



Jennifer Lewis

Jennifer Lewis's engineered materials look to nature as a guide. The new Wyss professor of biologically inspired engineering uses 3-D printing to build minuscule devices, from microbatteries to synthetic spider webs of threads a micron thick. Now she works to “print” biology, motivated by “a bit of naiveté mixed with a strong desire to benefit society.” Her lab develops “inks” with functional properties: cell-laden ones to print 3-D tissues, or conductive inks that flow through rollerball pens at room temperature to draw functional circuits on paper. Lewis works with high-school teachers to incorporate these inexpensive pen-on-paper electronics in their classes, so students can explore engineering through circuit design. Her educational interest draws on personal experience: despite coming from a family of engineers—her father worked for General Electric, and her sister is a chemical engineer—Lewis first encountered materials science in college at the University of Illinois. She later joined the faculty and taught there for 20 years (after earning her S.D. at MIT), returning to Cambridge for her new appointment in January. The move back East has given Lewis, an avid basketball player, a chance to pick up her squash racket again, as well. She’s also been exploring Boston through another longtime hobby: one of this fiction fan’s recent favorites is *The Dante Club*, a whodunit set in Civil War Cambridge, which helped immerse Lewis in her new community. She and her partner, Lori Sanders, who also studies biomaterials, live near the undergraduate Houses, “right in the heart of things,” and Lewis enjoys the intellectual stimulation of her new home: “It’s time to stretch and grow in new directions.”

periodically since to continue the dialogue.) The unanimous suggestion, he says, was to create a master’s degree—a recommendation supported by academics on the grounds that computational science and engineering still lack the clear career path and disciplinary focus needed to justify a doctoral degree (though Kaxiras predicts that this will soon change).

The Institute itself has begun laying the intellectual groundwork for this new field by developing courses in areas like scientific computing, data science, and numerical methods. “Computational science is always changing, and its needs and topics are changing,” says Kaxiras, “but the key ideas remain the same.” There’s a need, he explains, for sophisticated techniques from computer science and applied math that are properly matched to the complex problems at hand. For instance, situations from card games to market investments are often represented by systems of equations impossible for even the most high-powered computers to solve mathematically because of the near-infinite range of possibilities. Kaxiras has therefore developed and taught a course on stochastic optimization: a set of probabilistic methods that tries a large number of possible strategies to come up with a best guess—all that’s possible, he says, for many real-world problems.

In computational science, he continues, there’s a need for people who can “marry the hardware to the right software and the right algorithm.” For instance, big data now requires immense computing power, well beyond what any single processor can accomplish alone. “How do you break down a problem to take advantage of parallel computing?” he asks. “It requires a different way of thinking from the sequential mode of thinking we’re accustomed to. These developments have elevated the discipline and approach to something with serious intellectual potential.” Wang professor of computer science Hanspeter Pfister, the current IACS director, has developed and taught courses in visualization, computer graphics, parallel programming, and computational science; this fall, he and Joseph Blitzstein, professor of the practice in statistics, introduced a new course in data science that is jointly offered by the computer science and statistics departments.

Meanwhile, the new degree is promising as much for its applications as its academic focus. “Students come up with