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## What's Up, Postdoc?

By: Prachi Patel-Predd



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**ACADEMIC HEIGHTS:** Richard J. Radke had to endure a bruising process to get himself onto the first rung of the tenure-track ladder.

Late one night, Richard J. Radke was at his desk, putting together applications for faculty jobs. Nearing the completion of his Ph.D., he was hoping to embark on an academic career. A senior professor he knew well took Radke aside and said, "I hate to tell you this, but it's going to be brutal," he recalls. Radke, now an assistant professor in electrical, computer, and systems engineering at Rensselaer Polytechnic Institute, in Troy, N.Y., admits that his professor was right. Even once he'd landed a job, for the first few years he was constantly busy and stressed out as he learned the ropes and started worrying about tenure.

Roughly 28 percent of all electrical and computer engineering Ph.D.s follow the academic career path, according to a 2003 survey of doctoral recipients by the U.S. National Science Foundation. After five or six years as graduate students—a grueling stretch of time spent in proving that they can develop their own ideas and become well versed in research methods and goals—freshly minted Ph.D.s find themselves at the bottom rung of the academic ladder. Now their objectives must be to prove themselves in their fields, contribute to the learning in those fields, and in countries where it is offered, get tenure.

It is the start of serious multitasking—simultaneously writing research grant proposals, publishing journal and conference papers, advising graduate students, teaching multiple courses, and serving on school committees and engineering organizations. As Radke points out, the process can be very intimidating and stressful.

Typically, young academics in the United States start out as assistant professors, become associate professors if they get tenure, and may then be promoted to full professors.

Tenure at most schools requires some combination of research, teaching, and service on administrative committees. Schools usually do not weigh the service aspect as heavily as the others, and the emphasis on teaching and research varies, based on the school.

At research institutions, the focus is, naturally enough, on research. "If you're an excellent researcher and a so-so teacher, you're okay," says Russ Joseph, an assistant professor in electrical engineering and computer science at Northwestern University, in Evanston, Ill. "If you're a so-so researcher and an excellent teacher, that's not going to fly."

Conversely, liberal arts institutions generally emphasize teaching ability, although they do encourage research. At Swarthmore College, in Pennsylvania, there are no graduate students, but faculty members run research labs with the help of talented undergraduate researchers and funding from the college, says Associate Professor Bruce Maxwell. Swarthmore also gives faculty

members a research sabbatical every four years, a leave Maxwell is taking advantage of this year by working at a small start-up company.

Institutions that focus predominantly on undergraduate studies, such as Rose-Hulman Institute of Technology, in Terre Haute, Ind., usually make good teaching the top qualification for tenure. At Rose-Hulman, there is no pressure to write research proposals or to get funding, says Mario Simoni, an assistant professor of electrical and computer engineering, who chose the school because he wanted to teach. "I enjoy interaction with students, and I didn't want to spend my time worrying about where my next million dollars were going to come from," he says.

Just as a school's emphasis can shape its tenure requirements, its size can also affect who gets tenure. The opinions of individuals on a tenure committee in a smaller school can carry more weight than those in larger schools and could lead to more subjective decisions, Simoni says. On the other hand, there is a greater chance that people on the tenure committee in smaller schools are familiar with your research and could judge you better, Maxwell says.

The exact issues that young academics face depend on the school, but the pressure of the "tenure clock" is always on their minds. The term refers to the time period, six years or so, that young academics have to secure tenure. After that, chances are they'll find it impossible to get tenure at all.

That time frame can have a negative effect. The emphasis on research, for instance, can create undue pressure to publish. "In some sense, I feel a little guilty about being so driven about getting papers out," Radke says. "In the ideal sense of a scholar, you shouldn't be thinking about getting a paper out all the time."

Sometimes less is more. At the University of Michigan, in Ann Arbor, Domitilla Del Vecchio, assistant professor in electrical engineering and computer science, finds there is less pressure to churn out papers, because "they put a lot of stress on quality of publications rather than on quantity."

"A lot of publication occurs not because you have a great new idea but [because] you have an idea in your head that I need so many publications," says Gill Pratt, associate professor of electrical and computer engineering at the Franklin W. Olin College of Engineering, in Needham, Mass. Olin is taking an entirely different approach to faculty development by eliminating the tenure process completely. Instead, the college gives faculty members five-year contracts that are renewed based on teaching and research performance. [For more on Olin's new approach to engineering education, see "[The Olin Experiment](#)," *IEEE Spectrum*, May.]

Pratt, who was previously an associate professor at MIT, says that the key difference at Olin is that faculty, besides conducting traditional research, are encouraged to contribute to the field by participating in government service, consulting, and founding start-up companies. "Olin is recognizing that different people don't have to fit exactly the same mold," Pratt says. "We're trying to show that entrepreneurship along with research can exist together."

Apart from the entrepreneurship principle, Olin's system is similar to that in the United Kingdom, where reforms in the 1980s abolished tenure. British academics hold fixed-term appointments and are reevaluated at the end of the term, which can lead to their losing their positions. Tenure also does not exist in Japan, India, China, and other Asian countries, but although there are no guarantees, a full-time academic job in these countries is usually a permanent position.

The system varies widely in Europe. In most countries, including France, Germany, and Italy, only senior academics are appointed professors, a venerable, tenured position. Junior faculty members, typically called lecturers, can have fixed-term or permanent contracts, but they usually do not move up the ranks at the same university.

A key difference is that European countries give preference to older, more experienced people, says the Italian-born Del Vecchio, who is familiar with the European academic system. After earning their Ph.D.s, people commonly get postdocs, temporary positions to gain additional teaching and research experience, instead of being hired as assistant professors, she adds. In the United States, postdocs are a norm in science disciplines such as biology and physics but are uncommon for engineers; the NSF survey shows that electrical engineers make up only 0.5 percent of all postdocs.

The U.S. tenure process is considered a way to judge a new academic's potential and weed out weaker candidates. But Olin's Pratt argues that it is not the only way. Contrary to what some believe, the absence of a tenure system only makes him work harder, he says, because of the freedom to be creative, develop new courses, think about fresh ways to teach the same concepts, and consult with the industry and develop new products. "One of the fallacies of the tenure system is that if there weren't hoops to jump through, faculty would sit around and have coffee all day long," he says. "[Here] folks create their own hoops to jump through."

But others believe that tenure drives the bar up for quality. Radke says that the tenure clock pushes him to do more and makes him a better researcher. According to Michael Flynn, associate professor of electrical engineering and computer science at the University of Michigan, "The tenure process is one of the reasons that the U.S. has the best schools in the world." Northwestern's Joseph believes that the job security that comes with tenure gives academics freedom to voice their opinions and to perform high-risk, high-reward research as well as teaching.

Whether or not people spend their time as assistant professors stressing about getting tenure, Radke believes they clearly love what they are doing if they have chosen academic careers,

especially in engineering. Unlike such other fields as liberal arts and social sciences, it is much easier to get a high-paying private-sector job in the technology field, he says. Like other academics, he chose the career for the freedom of pursuing research that interests him and for the rewards of teaching. "There is nothing like the academic lifestyle for flexibility," he says. "No one is watching over my shoulder to see when I'm in the office."

#### **About the Author**

PRACHI PATEL-PREDD, a regular contributor to IEEE Spectrum, is a freelance writer who covers technology, energy, and the environment.