and friends. Being an academic means being pulled in too many directions—by research, promotion requirements, student crises and successes, routine teaching, reports and memos and emails, perhaps even a personal life, and on top of it all, by your own enthusiasm and passion. The process of figuring out what matters and how to do it is lifelong and starts now.

There are no ruby slippers that will get you any one particular math job that you want. The steps I've outlined will get you a bunch of top ratings from our hiring committee—after that, there's a roll of cosmic dice. But the steps that I've outlined are also the process to a rewarding mathematical career: finding and doing the things that are meaningful to you, engaging deeply with students, and stretching your own intellectual limits.

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Author photo is courtesy of Smith College.

What to Expect at a Large Public Research University

David Jensen and Christopher Manon

A tenure-track position at an R1 public university will differ from other experiences in higher education in a few notable ways. Such positions typically have a greater focus on research productivity, and often have opportunities to integrate research into education. Teaching at a large public university also involves interacting with students from a wider range of educational backgrounds. We both have tenured positions at the University of Kentucky, and between us, we have attended and worked at several large, research-focused public universities, including the University of Texas, the University of Maryland, Stony Brook, and Berkeley. Departments at universities such as these share many commonalities.

Research

One of the major advantages of a research university is the existence of vertically integrated research communities. Our program has groups of graduate and undergraduate students, postdocs, and faculty at every stage of their career, all working in the same or related areas. All of these people interact mathematically to their mutual benefit. For example, tenure-stream professors have the opportunity to design and teach graduate classes and mentor PhD students. While the educational benefits of such opportunities are clear for the student, they also broaden and strengthen the research programs of the faculty. Similarly, research groups often run a seminar, bringing in speakers from all over the mathematical community, providing both students and faculty with a chance to learn about advances in mathematics beyond their own department. The give-and-take at seminars often leads to further developments and potential collaborations.

The central metric for evaluation, tenure, and promotion at an R1 is research, and often research productivity plays a role in decisions about salaries or teaching load. In order to help faculty meet these expectations, course loads are typically lower than at more teaching-focused institutions. (If a prospective employer tells you that they value research but that your teaching load will be 4–4, they are not telling you the whole truth.) Tenure-stream faculty are also expected to apply for research grants. This means that in addition to doing mathematics research, writing papers, planning and teaching classes, and the usual bout

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of service, a faculty member will devote a portion of their time to writing grant proposals.

Teaching

Research universities can be either public or private. While the distinction does not affect one's life on a daily basis, it can have a large effect on the university's priorities. Public universities often have a more stable source of funds (though there are exceptions), but they are also subject to the political whims of the state government.

At public universities like the University of Kentucky, the undergraduate students tend to come from nearby geographical areas. Because they are more affordable, schools like ours typically serve students from a broader range of socioeconomic backgrounds. We often have students who are very capable, but are coming from schools where they have not been challenged. As a result, they have not yet acquired the skills to "be a student." For such students, college is the first time that they have struggled in a classroom, and they don't know what the expectations are. Students also frequently have responsibilities outside of the classroom, such as regular family obligations or a job. In first-year classes like calculus, it is potentially more important to teach good study habits than it is to teach L'Hôpital's rule. Public universities like the University of Kentucky also have students from competitive high schools with sophisticated STEM programs, who come to take advantage of the resources of a research-oriented department. These students may arrive prepared for sophomore- or junior-level mathematics courses, or even courses at the graduate level. Indeed, the existence of graduate courses is one of the potential draws for such students, giving them the opportunity to learn math at an advanced level and firsthand experience with the life of a graduate student.

Service

Every department has a fixed amount of work that needs to get done outside of the classroom. Someone needs to do graduate admissions, someone needs to coordinate outreach programs, someone needs to supervise teaching assistants, someone needs to revisit the core curriculum, and so on and so forth. One of the benefits of a larger department is that faculty have more space to choose the service that appeals to them.

For example, we both have an active hand in the University of Kentucky Math Lab, with Chris as director and Dave as a frequent research mentor. The UK Math Lab has been running since the spring of 2018, with an average of four research groups per semester making use of it. The math lab gives undergraduates a year-round research experience, where they work closely with professors, graduate students, and postdocs on an open problem. For a participating faculty member, this requires coming up with a research problem that is both within reach of a bright undergraduate and a means to teach some interesting piece of mathematics, and the willingness to take time out of an already busy schedule. Our lab has had a positive community-building effect among the undergraduate mathematics majors. They have a place where they can ask questions and raise concerns about their experiences at the university, and take the next steps of their careers.

The world of higher education is broad and can be difficult to navigate. There are many different ways to be a mathematician, and the tenure-stream position at a research-oriented public institution is but one of them. While we hope to have shed some light on this part of the mathematical world, we encourage you to talk to people and learn about other parts as well.


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Author photos are courtesy of Kaelin Cook-Powell.

How to Prepare for a Career at a Teaching-Oriented Institution

Sarah Crown Rundell

Are you passionate about mathematics and interested in sharing your passion with undergraduates? Are you interested in mentoring and advising undergraduates? Are you interested in close interactions with students in the classroom and outside the classroom at department and campus events? Are you dedicated to continually learning and trying new pedagogical techniques and reflecting on ways to improve your teaching? If you answered "yes," perhaps you're interested in preparing to teach at a teaching-focused institution. In this article, my suggestions stem from my experiences as a student and faculty member at small liberal arts institutions, although I'll try to make my suggestions apply more broadly to teaching-oriented institutions as a whole.

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