



PROFESSIONAL DEVELOPMENT AND RECRUITMENT OF RESEARCHERS – COMPARATIVE NOTES

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UNIVERSITY: The undergraduate cycle starts after 12 years of primary and secondary education. Entrance requirements vary greatly; some state universities accept all applicants, while the most selective private universities may accept fewer than 10%. The first-level degree (Bachelor of Arts, B.A., or Bachelor of Science, B.S. or Sc.B.) is obtained after four years and is only lightly specialized. The second-level degree (Master of Arts, M.A., or Master of Science, M.S. or M.Sc.) usually involves about two years of specialized coursework, as well as a thesis. However, many at many universities, the PhD program subsumes the Master's-level program, so that doctoral candidates do not write a separate Master's thesis (and at some universities do not receive a separate Master's degree). The PhD program is not of fixed duration. PhD candidates graduate when their research is finished to the satisfaction of their advisors and/or departments. According to the American Institute of Physics (AIP), physics PhD recipients in 2003-2004 spent an average of six years working towards the degree, where this number includes coursework for the Master's level degree, whether granted or not. Admissions to PhD programs are generally competitive. In the physical sciences, doctoral candidates are usually supported on fellowships for teaching (for the first two years) or research (in subsequent years).

POST-DOCTORAL EMPLOYMENT: A post-doctoral research fellowship typically lasts two to three years. Recent PhDs in the physical sciences can expect to serve in at least one post-doctoral appointment before finding a tenure-track position. According to the AIP, in 2003-2004, typical gross annual salary ranges for physics postdocs were \$35,000-\$43,000 at universities and \$48,000-\$60,800 at government institutions. Most postdocs are supported on the grants of their advisors; a lesser number receive apply for and receive grants of their own. Whether or not postdocs are considered employees depends on the nature of their appointments. Most postdocs do receive at least some benefits from their institutions.

PERMANENT EMPLOYMENT: Permanent employment at universities is based on the concept of tenure, originally intended to guarantee academic freedom. A young researcher may apply for a "tenure-track" position, usually with the title of Assistant Professor. The maximum duration of a tenure track position is typically five to seven years. Towards the end of this term of appointment, the university evaluates the performance of the researcher on the basis of his or her achievements in research, teaching performance, professional prominence, awards, and ability to attract grant money.

University researchers apply for grants from public and private funding agencies, so the latter is an important consideration in tenure decisions. Tenured faculty members are usually Associate Professors or Professors. The probability for an Assistant Professor to be granted tenure varies greatly from university to university. Although the title Assistant Professor implies a fixed-term appointment, not all such positions are tenure track. There also exist several types of academic positions (such as Lecturer, Research Professor, or Adjunct Professor) that are renewable as resources permit, but which do not guarantee permanent employment and do not lead to evaluation for tenure. According to a 2006 AIP study, the fraction of full-time university physics faculty in temporary or non-tenure-track employment was 18%. In physics, the major national laboratories are operated under contract with the U.S. government, providing a certain degree of institutional autonomy. Like universities, the national laboratories offer post-doctoral positions, including fellowships that can lead to evaluation for permanent hire. For example, the Wilson Fellowship at Fermilab is an adaptation of the tenure-track model to the national laboratory context.