

E-SKILLS

Boot camps and degrees

For job applicants with the right core skills, companies and government agencies often provide the training for specialized tasks. But how can job seekers acquire the skills that will get them noticed?

Among degree-granting cybersecurity institutions, Carnegie Mellon University's CyLab in Pittsburgh, Pennsylvania, the Lincoln Laboratory at the Massachusetts Institute of Technology in Lexington and the Maryland Cybersecurity Center at the University of Maryland in College Park are some of the best-known US programmes. In the United Kingdom, the University of Oxford and Royal Holloway, University of London received £7.5 million (US\$12.5 million) in government and research-council funding in 2013 to offer multidisciplinary PhD degrees in support of national cybersecurity interests.

Beyond a degree, most job

seekers must also earn some form of professional certification. One of the field's most important is the CISSP (Certified Information Systems Security Professional), which is commonly required for government work. Another is the CEH (Certified Ethical Hacker), which applies to professionals who help clients to bolster their defences through simulated attacks, or penetration testing.

Institutions often provide certification training for their own workers or students. Other individuals can study at university-sponsored or corporate training centres that host intensive one-week boot camps costing US\$2,000 to \$4,600 or more. With names such as Intense School and SecureNinja, these programmes run students through a rigorous regimen of drills and reviews to prepare for the certification's final examination. **B.N.**

patterns that can be applied to groupings of similar people, tweets, Facebook data, documents and other information. As a security tool, the work might help to identify leaders and followers in online communities and use that knowledge to predict criminal activity or to detect fraud.

A strong background in maths, meanwhile, might provide an advantage for cryptography, a subspecialty that involves writing or breaking secret codes that are designed to protect data or channels of communication. Peter Ryan, professor of applied security at the University of Luxembourg, had been fascinated by codes since childhood, but began exploring cybersecurity only after receiving his PhD in mathematical physics from the University of London. He later found a job in cryptography at the UK intelligence agency Government Communications Headquarters.

At the University of Luxembourg, Ryan uses some of the same maths-based methods to make touch-screen and other electronic voting systems less vulnerable to tampering. "We try to imagine how an attacker might attack these and, as best we can, develop techniques to foil all of the attacks we can come up with," he says.

Other specialists have found a niche in quickly neutralizing potential cybersecurity threats. Krysta Cox, an analyst for ManTech International Corporation based in Washington DC, describes her job as an emergency medical technician for computer networks — "you're the first responder when an incident happens", she says. If an employee at one of her corporate clients receives a suspicious e-mail that asks the reader to follow

a link and reset a password, Cox sequesters the message within a secure system that is isolated from the rest of the computer network. Then she clicks on the link to see where it leads. If the destination spells trouble, she can capture the information and instruct the computer network to automatically flag similar e-mails to prevent future risks.

Anyone wanting to enter the cybersecurity job market should be aware that irrespective of speciality, stringent background checks are routine, especially for a government agency or a private contractor working closely with one. "You need to expect investigators to go over every single aspect of your life," says Integrata's Geppi. Ill-advised Facebook posts, tweets and other social-media messages can come back to haunt potential job applicants.

And in many countries, positions within government or with government contractors may require proof of citizenship or long-term residency. Foreign students may have more success pursuing a job in academia, or with multinational companies.

Beyond these caveats, experts say that motivated individuals with strong scientific skills should be well positioned for a successful cybersecurity career. "Security is always a cat-and-mouse kind of game, and often the attackers are a bit ahead," Ryan says. "In a way, it's slightly depressing that it's like that, but in another sense it's actually quite fun. And it means that there's probably not going to be any shortage of jobs for people for a long time to come." ■

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EQUAL OPPORTUNITIES

Minority support

A consortium of four US universities aims to boost diversity in maths, engineering and physical and computer sciences with the help of a US\$2.2 million grant from the US National Science Foundation.

The California Alliance for Graduate Education and the Professoriate is being led by the University of California (UC), Berkeley, and includes UC Los Angeles, the California Institute of Technology in Pasadena and Stanford University. The universities aim to create a community of minority PhD students, postdocs and faculty members by providing training and funding travel between institutions. "We want to create an environment that's more welcoming," says Mark Richards, executive dean of the College of Letters and Science at UC Berkeley.

FELLOWSHIPS

Canada needs managers

The Canadian federal government is investing Can\$8 million (US\$7.3 million) over two years to tackle the country's shortage of research and development managers. Mitacs, a nonprofit organization in Vancouver, will run a fellowship programme to support 125 to 150 postdocs in industrial research, providing training in skills such as management and leadership. Researchers who have received a PhD from a Canadian university within the past five years can join the scheme. The employment rate is high for those who have finished the pilot programme, says Arvind Gupta, Mitacs chief executive and scientific director. "Researchers come out of the programme with the skills to manage a company's research portfolio," he says.

DISCRIMINATION

Race obstacle

One-fifth of workplace barriers faced by minority researchers in behavioural science are related to race, a study says (R. R. Kameny *et al.* *J. Career Dev.* **41**, 43–61; 2014). In addition to barriers such as a lack of mentors, early- to mid-career US minority researchers identified race-related hurdles such as colleagues' low expectations of performance and a lack of support for studies on minority groups. Minority researchers must seek help from faculty members who are capable of changing the department culture, says co-author Rebecca Kameny, a psychologist at the research company 3C Institute in Cary, North Carolina.