

# An Inventory of Privacy Curricula Offerings in Higher Education

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## Abstract

Privacy workforce development is a growing need as organizations struggle to find qualified privacy professionals such as Data Protection Officers and privacy engineers. Little has been written about the availability of formal privacy education opportunities that could satisfy this demand. This study inventoried the current state of formal privacy education at institutions of higher education. The inventory included information on 115 privacy programs and 333 privacy courses offered at 99 institutions around the world. Analysis revealed that privacy education is dominated by legal and compliance curricula at the graduate level, with other data privacy opportunities available in smaller quantities.

Keywords: privacy education, privacy workforce development, privacy curricula, privacy in higher education

## 1. INTRODUCTION

Privacy workforce development is a pressing need in the privacy industry. Half a million organizations have registered Data Protection Officers (DPOs) in Europe since the General Data Protection Regulation (GDPR) went into effect in 2018 (Fennessy, 2019c). The demand for privacy engineers, individuals who understand privacy and can build it into products and services, has

grown significantly in recent years (Fennessy, 2019a). Stakeholders who commented on the **National Institute of Standards and Technology's** (NIST) emerging Privacy Framework identified **privacy workforce development as a "critical" need** (Fennessy, 2019b). Another source reports that companies from all over the world are **"having trouble finding" qualified privacy professionals** (Kingson, 2019).

With present and future needs for privacy professionals, it is important to understand the current state of formal privacy education. Security is related to, but different from, the problem of privacy, thus an investigation of privacy workforce development must go beyond looking at security programs in higher education. It is not clear from the literature and existing inventories of privacy programs what privacy opportunities exist in higher education. Existing inventories (International Association of Privacy Professionals, n.d.-b, n.d.-d) are not comprehensive and are not dynamically updated to reflect the current state of available privacy offerings. General information regarding these opportunities is lacking, such as whether opportunities exist for undergraduate students or how many privacy schools exist in each geographic region. Thus, prospective privacy students may not have an effective avenue for identifying institutions of higher education that offer programs within their area of interest.

This paper presents an inventory of 115 privacy programs and 333 privacy courses in higher education from 99 institutions around the world. Previous inventories do not go below the university level when discussing the general state of the privacy education landscape. Several charts are presented, summarizing key statistics of existing programs and courses as well as the universities housing these privacy offerings.

The remainder of this paper is as follows: section 2 summarizes the current knowledge of academic privacy programs generally; section 3 lays out the methodology for inventorying the existing academic programs and courses in privacy; section 4 presents the results of the inventory; section 5 discusses these results; and section 6 concludes the paper and outlines future opportunities.

## 2. LITERATURE REVIEW

The International Association of Privacy Professionals (IAPP) is the largest non-profit and policy-neutral organization **“that helps define, support and improve the privacy profession globally”** (International Association of Privacy Professionals, n.d.-a). The IAPP has published two inventories of privacy curricula at institutions of higher education. One is a webpage with information on 74 institutions offering privacy content from around the world, providing details about online availability, whether they can be completed part-time, possible externships/internships and whether prerequisite degrees were required (International Association

of Privacy Professionals, n.d.-b). Details about how this inventory was prepared are lacking, and some universities were listed only for having privacy research groups rather than privacy courses. The second IAPP inventory of privacy programs began with a 2019 study of the privacy offerings from law schools that have been accredited by the American Bar Association (International Association of Privacy Professionals, n.d.-d). The study split law schools **into four categories: “Tier 1,” which were schools that offered a formal concentration or certification in privacy law; “Tier 2,” which were schools that offered at least one three-credit course on privacy each year; “Tier 3,” which were schools that offered some sort of privacy content, but didn’t meet the criteria for being categorized as Tier 2, such as those who offer a one-credit seminar on privacy or have offered privacy courses in the past, but not consistently; and “No Data/Not Counted,” representing schools that had no privacy law offerings.** The study found that 107 of the 216 (49.5%) law schools had no privacy law content at all, with another 68 (31.5%) schools being categorized as Tier 3 with minimal privacy offerings. The remaining 19% of schools were split between Tier 2 – 30 schools (14%) – with a single course and Tier 1 – 11 schools (5%) – with fleshed out privacy offerings.

Privacy can be split into three major subdisciplines – Legal/Compliance, Management and Technology. Examples of privacy work roles can be found in (Farber, 2018): legal and compliance roles include privacy attorneys and Data Protection Officers (DPOs); privacy managers could include Chief Privacy Officers (CPOs) as well as privacy product managers; and technical privacy roles include privacy engineers and designers of novel privacy-enhancing technologies. This categorization scheme is **reflected in the IAPP’s entry-level professional certification programs, which split privacy work roles into those of compliance, management and technology** (International Association of Privacy Professionals, n.d.-g). In the first half of 2020 ISACA released their Certified Data Privacy Solutions Engineer certification program (ISACA, n.d.). **ISACA has dubbed privacy “a growth sector,” with their research suggesting that as many as 40% of organizations “lack competent resources” to establish effective privacy programs.** In August 2020, business magazine *Inc.* named data privacy firm OneTrust as the fastest growing company in the United States (Hughes, 2020). The inception of the privacy industry in the United States can be traced back to the enactment of the California Consumer Privacy Act in 2018, with the number of privacy

vendors more than quintupling from 44 to 259 between 2017 and 2019 (Ingram, 2020).

The IAPP has launched a program called Privacy Pathways in which they help universities to build out their privacy curricula (International Association of Privacy Professionals, n.d.-e). Information about this program is lacking, although it appears that it is primarily focused on bolstering law programs. In France, universities have been moving fast to train DPOs and combat the talent shortage facing that country (Abboud, 2018), with another author suggesting that a time when students will commonly go to school for privacy studies is fast approaching (Hulefeld, 2018). On May 3, 2019, privacy scholar Daniel Solove tweeted the following: **"Ridiculous that most law schools don't have a privacy law course let alone a faculty member doing scholarship in the field. It's time for law schools to wake up"** (Solove, 2019). Solove suggests that at a minimum law schools should teach a single course in privacy law, but ought to teach several (Solove, 2016). Kevin Streff, founder of SBS Cybersecurity and Professor of Information Assurance at Dakota State University, stated **"data privacy education is going to explode in the coming years"** (personal communication, June 15, 2020).

Industry training in privacy exists and privacy offerings are widely available on online learning platforms. **For instance, searching for "privacy"** on LinkedIn Learning (formerly Lynda.com) gives 1,542 total hits, with 64 courses and 1,494 videos (LinkedIn, n.d.). Coursera has 128 results for **"privacy," 27 of which are specializations, certificates or degrees** (Coursera, n.d.). Pluralsight has 114 courses dealing with privacy topics (Pluralsight, n.d.). Many of these search results likely included a spectrum of privacy content, spanning dedicated courses to results that barely touch on privacy but otherwise contained the word in their metadata - a full analysis was not performed on these results. The recent growth of privacy curricula in higher education is in stark contrast to the corporate world, where some level of privacy training has been commonplace for several years (Solove, 2012). The International Association of Privacy Professionals provides several training classes (International Association of Privacy Professionals, n.d.-f) and online privacy courses (International Association of Privacy Professionals, n.d.-c). Privacy is also being incorporated into information security industry training as well - for example, privacy is a major **focus of SANS Institute's "Law of Data Security and Investigations"** course (SANS Institute, n.d.).

### 3. METHODOLOGY

Data on privacy programs, privacy courses and their associated universities were all gathered as part of this inventory. The two existing inventories provided by the IAPP served as the foundation of this inventory, providing 82 universities, 97 programs and 288 courses. Additional programs and courses were found by conducting exploratory searches with Google and DuckDuckGo between late 2018 and early 2020 **utilizing keywords such as "privacy degree" and "privacy certificate."** Thus, the whole dataset was manually collected through web searches. Additionally, any privacy offerings and universities that were known to the authors were also included. Utilizing these methods, privacy offerings from 17 additional universities were included, for a combined total of 99 universities.

Except for international programs mentioned in the IAPP inventories, only courses and programs that were available for review in English were included in this inventory. Only courses that **explicitly mentioned "privacy" or "data protection" in the title of the course** or in their course descriptions and had a major focus on one or both topics were included in this inventory. Courses that generally mentioned compliance, ethics, cybersecurity or other concepts involving or related to privacy and data protection were not included in this inventory unless privacy or data protection were a major theme of that course, as suggested by the course title or course description. A program was included only if it contained at least one privacy course, either offered as an elective that counted towards the program or as part of the core curriculum. **The program itself did not need to include "privacy" or "data protection" in its title or otherwise have its focus be on privacy.** Individual privacy courses that were not clearly associated with a degree program were represented in the courses count but did not contribute to the degree program count. Universities in existing inventories that did not have privacy curricula upon inspection were excluded from this study.

The following summarizes the main data points collected as part of this inventory. All universities, courses and programs were categorized according to the area or areas of privacy their content focused on, split among the areas of Legal/Compliance, Technology, and Management, which were discussed in the literature review. Courses and programs that belonged to more than one subfield of privacy were given the Interdisciplinary label. For a program to be labeled as anything other than

Interdisciplinary, it needed to have more than 66% of its privacy content be in one subfield of privacy – for example, a program consisting of five privacy courses with three of those courses focusing on the intersection of privacy and technology would be categorized as Interdisciplinary, but if instead four of those courses were technical, then the program would be labeled as Technology. An otherwise technical cybersecurity program with one privacy course focusing on legal and compliance topics would be labeled as a Legal/Compliance. The program level – Undergraduate, Graduate, Minor, or Certificate – was also collected. Similar programs were combined if they fell under the same program level and were similar in nature, such as multiple Juris Doctor concentrations and Master of Laws programs that shared curricula, or doctoral programs being combined with their associated **master’s degrees**.

Courses were labeled with a non-Interdisciplinary category unless the course description or course title suggested mostly interdisciplinary content. **For instance, one course description stated “we will examine the privacy protections provided by laws and regulations, as well as the way technology can be used to protect privacy”** (Carnegie Mellon University, n.d. -a). This course was categorized as Interdisciplinary because both legal and technical privacy topics were covered, and the two disciplines appeared to be given approximately equal weighting. Universities were also labeled according to the subdiscipline of privacy they focused on, with the most-represented discipline among privacy programs offered at the institution determining the label. Geographic information was collected about the physical location of the universities, utilizing the following categories: Asia-Pacific; Canada; European Union; United Kingdom; US, Midwest; US, Northeast; US, South; and US, West. The four geographic regions in the United States correspond to the four regions utilized during that **country’s decennial census**.

#### 4. RESULTS

The final inventory resulted in 99 universities, 115 programs and 333 courses. Refer to the Appendix for a list of the universities. Figure 1 shows the relative distribution of the levels of the 115 collected privacy programs. Most privacy programs are at the graduate level, which **includes law programs, master’s degrees, and other non-certificate graduate opportunities**. Certificate programs, including those at both the undergraduate and graduate levels, made up the second-largest program level category. There

were five undergraduate programs with privacy curricula. The only minor in privacy is offered by the University of Amsterdam (University of Amsterdam, n.d.).

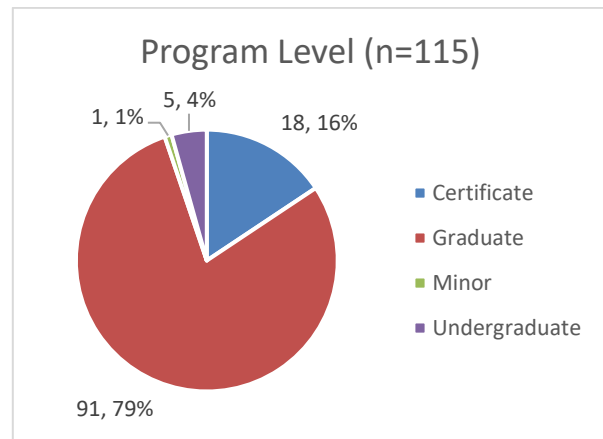


Figure 1: Distribution of Privacy Program Level

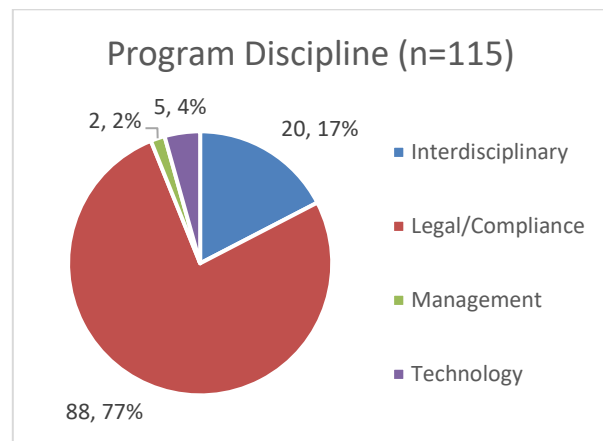


Figure 2: Distribution of Program Discipline

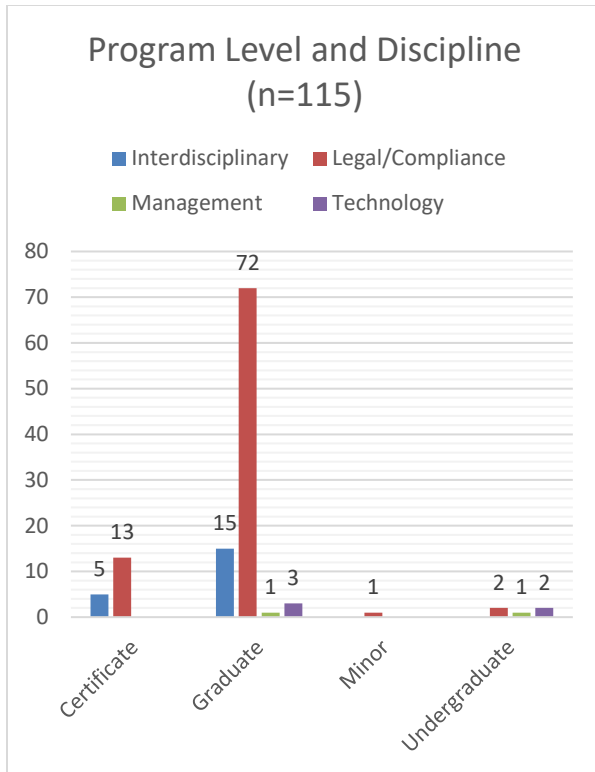


Figure 3: Distribution of Program Level and Discipline

Most privacy programs focus on legal and compliance topics, as indicated in Figure 2. Counting these with Interdisciplinary programs reveals that 94% of the programs inventoried do not primarily emphasize managerial or technical privacy content. Figure 3 shows this program discipline distribution combined with the program level information. Most of the Legal/Compliance education in privacy is at the graduate level or in certificate programs, whereas both Management and Technology are distributed similarly between graduate and undergraduate programs. Interdisciplinary education in privacy was represented at the graduate level and in certificate programs but was completely lacking in undergraduate degrees. As Figure 4 shows, privacy programs tend to have few courses, with 39 (34%) having just one course and 57 (50%) of them having only one or two courses. The distribution is most heavily concentrated towards low course counts, with the number of programs negatively correlated with the number of privacy courses.

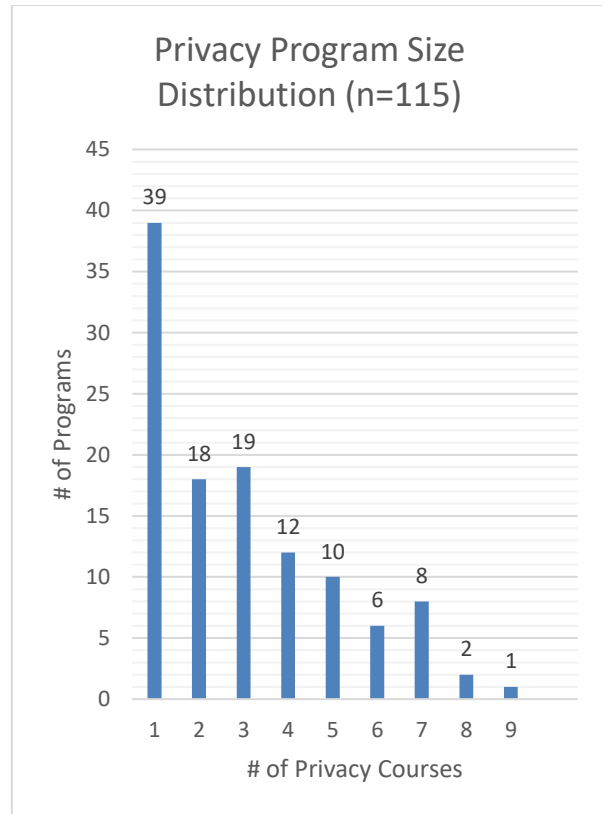


Figure 4: Distribution of Privacy Program Size

The study looked at 333 privacy-focused courses. Figure 5 shows the relative distribution of privacy subdisciplines among the courses. The proportions at the course level are similar as they were at the program level, with one key difference – Management and Technology courses are still in the minority but have approximately double the representation at this level of analysis at 5% and 9% respectively. Legal/Compliance courses made up 76% of privacy courses, with Interdisciplinary privacy courses being slightly more common than technical ones at 10%.

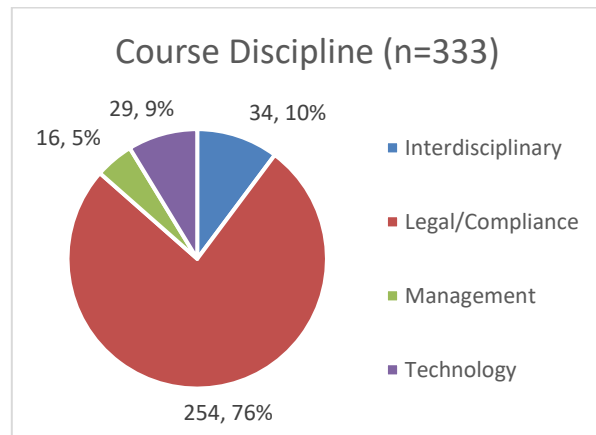


Figure 5: Distribution of Course Discipline

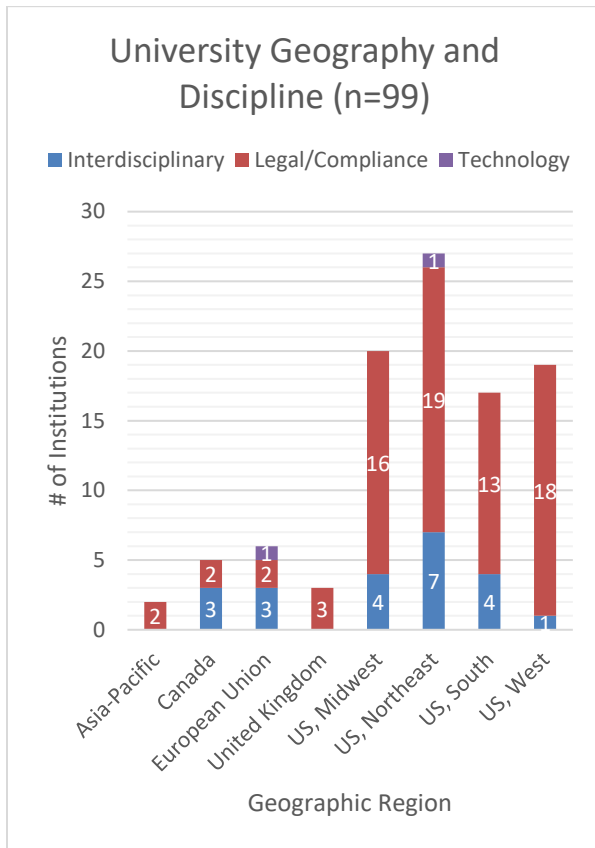


Figure 6: University Locations and Discipline Focus

Figure 6 shows that 83 universities, or 84%, are located within the United States of America. Five institutions are in Canada, nine in Europe and two in the Asia-Pacific region. No university had privacy management as its primary focus, although interdisciplinary programs are available in Europe and North America.

## 5. DISCUSSION

The data collected reveal several aspects of the current state of privacy education. At all levels of analysis, legal and compliance topics dominate the privacy education landscape, with management and technical offerings scarce or nonexistent. Interdisciplinary courses and programs are more common than management and technical offerings but are far less common than legal and compliance offerings at each level of analysis. These factors combined indicate that the current state of privacy education is narrowly focused on graduate education and legal and compliance topics, despite the current demand for non-legal privacy professionals and privacy being an interdisciplinary issue.

While no Technology or Management programs offered more than one or two courses, a handful of Interdisciplinary and Legal/Compliance programs stood out as exemplary. One example of a mature Interdisciplinary privacy program is **Carnegie Mellon University’s Master of Science in Information Technology – Privacy Engineering** (Carnegie Mellon University, n.d.-b). Their program features six core privacy courses with varying levels of technical and legal/compliance emphasis, a seminar on current topics in privacy, as well as internship and real-world capstone project opportunities. It was the first dedicated university program in privacy engineering and remains the only option for getting a degree in privacy engineering seven years after launching (Fennessy, 2019a). A mature privacy law program is the University of Illinois at Chicago **John Marshall Law School’s LLM in Privacy & Technology Law** program (The Board of Trustees of the University of Illinois, n.d.). This LLM program combines intellectual property topics with privacy, with two of the four required core courses in privacy and six privacy electives to choose from. As per the program’s webpage, the program is also “the only graduate law program in the country that emphasizes privacy as part of its core curriculum.” Although there were no mature privacy programs that compared to these two examples specifically for Management or Technology, there were several courses in Management and Technology offered as electives as part of other programs, and these two subdisciplines were also frequently covered within Interdisciplinary courses. Thus, there are still opportunities for students wishing to learn about those subfields of privacy.

Privacy programs can be developed in various ways, as indicated by the diversity of program size, degree level and subdisciplines of privacy emphasized among existing curricula. The tendency towards low counts of privacy courses in programs, along with the fact that the inclusion criteria for courses and programs were minimal in this study, is reminiscent of the dawn of cybersecurity education. As part of the early efforts to expand information assurance education, the United States federal government established the Centers of Academic Excellence (CAE) program. To be designated as a CAE back in 2004, a university, in addition to other requirements not related to their information assurance curricular content, needed information assurance to be taught in existing courses, but **having dedicated courses on the topic wasn’t necessary** (National Security Agency, n.d.). Privacy is developing in a similar manner as cybersecurity did, primarily existing as subtopics

within courses or as a handful of electives at most universities, as indicated by this inventory. Over time, as privacy matures as a field of study in higher education, programs will expand and become more common. Perhaps some standard-setting body could establish an analogous CAE program for privacy to incentivize excellence and competition in privacy education.

At the university level, most privacy education discovered as part of this inventory is focused on the legal and compliance aspects of privacy, with schools almost evenly spread out across the four regions of the United States. Most of these universities are law schools that offer one or more privacy courses. This means that law students attending schools in the United States who are looking for privacy content have a wide array of options. Dedicated privacy management and technology offerings are too sparse to judge what program maturity in these areas consists of. In general, privacy education is still incredibly rare in the United States of America, with privacy programs being offered at only 83 of the 4042 (Institute of Education Sciences, n.d.) institutions of higher education, or in just over 2% of all American institutions.

Another noteworthy insight is that no university was found to emphasize the managerial subdiscipline of privacy, although several universities had Interdisciplinary privacy curricula that included management curricula and two management programs were found. Additionally, although not as lacking as management options, only two universities specifically addressed the technology subdiscipline of privacy. It is far more difficult for students who are interested in technical or managerial privacy curricula to find appropriate educational opportunities.

## 6. CONCLUSIONS

Future improvements to this inventory could include seeking out international, non-English programs to get a more global perspective on the state of privacy education. Research institutes, centers and labs with a privacy focus could also be inventoried, which would be valuable for prospective students interested in privacy research opportunities. The data collected for this study could be made more granular. The online availability of courses and programs would help those students working full time or those looking for distance opportunities. Collecting data through direct communications with institutions could help prevent faulty, outdated, or misleading course descriptions from influencing the data. Alumni from privacy programs could be

interviewed to document and compare privacy curricula for job alignment and quality. A privacy curricula maturity model for each subdiscipline of privacy could be developed and used to rate current privacy offerings and guide their development.

The inventory presented in this paper could form the basis of a continuing reference database for those interested in professional development in the privacy field. Such a database could be queried for privacy institutions, programs and courses that meet specified criteria, and could be updated as new privacy offerings are made available by schools. This database could be invaluable for all who have a stake in privacy workforce development, such as prospective students, institutions of higher education, career counselors and recruiters of privacy talent graduating from privacy programs.

This study illustrated that much work is necessary before all aspects of privacy education are widely available. Undergraduate offerings in privacy are scarce and the managerial and technical aspects of privacy education have not received as much attention as the legal and compliance aspects of the field. Additionally, resources that communicate information about current privacy education opportunities can ensure that latent privacy talent is able to locate appropriate privacy programs.

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Appendix

Table A1: List of the 99 universities included in this inventory

Albany Law School	Robert Morris University
American University Washington College of Law	Rochester Institute of Technology
Baylor University	Ryerson University
Boston College Law School	Saint Louis University School of Law
Boston University Metropolitan College	Santa Clara University School of Law
Boston University School of Law	Seoul National University School of Law
Brooklyn Law School	Seton Hall University School of Law
Brown University	Southwestern Law School
Cardozo Law	Stanford Law School
Carnegie Mellon University	Tilburg University
Chicago-Kent College of Law	Touro Law Center
Cleveland-Marshall College of Law	Universidad San Pablo CEU
Columbia University	University at Buffalo
Dakota State University	University of Alaska Southeast
Davenport University	University of Alberta
DePaul University Law Center	University of Amsterdam
Drexel University	University of Arizona
Duke University	University of California, Berkeley
Embry-Riddle Aeronautical University	University of California, Hastings
Florida State University College of Law	University of California, Irvine
Fordham University School of Law	University of Chicago
Franklin Pierce University	University of Colorado Boulder
George Mason University	University of Denver Law School
George Washington University Law School	University of Florida
Georgetown University	University of Guelph
Georgia State University	University of Illinois School of Information Sciences
Golden Gate University Law School	University of Maine
Harvard University	University of Maryland
Indiana University	University of Massachusetts Amherst
Iowa State University	University of Massachusetts School of Law
John Marshall Law School	University of Minnesota
Johns Hopkins University	University of New Hampshire
Karlstad University	University of North Carolina Chapel Hill
KTH Royal Institute of Technology	University of Pennsylvania
KU Leuven	University of San Diego
Loyola Law School	University of San Francisco
Loyola University of Chicago	University of Southampton
Marquette University	University of Southern California
Mitchell Hamline School of Law	University of Strathclyde
New Jersey Institute of Technology	University of Texas, Austin
New York Law School	University of Texas, El Paso
New York University	University of Toronto
Northeastern University	University of Utah S. J. Quinney College of Law
Northwestern University	University of Washington
Norwich University	Victoria University of Wellington
Ohio State University	Washington University
Ottawa University	Wayne State University Law School
Pepperdine University	Western Michigan University
Purdue University Global	William & Mary Law School
Queen Mary University of London School of Law	