A Path to Obtaining Cybersecurity Work Experience: Internships, Cooperative Education, and Apprenticeships

November 15, 2017
National Cybersecurity Career Awareness Week
November 13-18, 2017

The National Cybersecurity Career Awareness Week is a celebration to focus local, regional, and national interest to inspire, educate and engage children through adults to pursue careers in cybersecurity.

Learn More: nist.gov/nice/nccaw
Cyber Co-ops and Internships
A partnership between UC, employers, and students

Vicki Baker
Director of Cyber Research Initiatives
UC Cyber: A Unique Multi-Disciplinary Approach

UC Cyber is a collaboration:

- College of Education, Criminal Justice & Human Services
  - School of Information Technology (SoIT)
  - Dept. of Criminal Justice
- College of Engineering and Applied Sciences
  - Dept. of Electrical Engineering & Computer Science
- College of Arts and Sciences
  - Dept. of Political Science
- UCIT (Information Technology)
- Army ROTC
- Office of Research
Faculty Expertise Across the Cyber Spectrum

- UC Cyber
  - Strategic & Policy Analysis
  - Info Security Analytics
  - Reverse Engineering
  - Secure Software & Network Integration
  - Algorithm Dev/ Data Encryption
  - Malware Detection
Training the Next Cyber Workforce

Two Certificates
- Undergraduate Cybersecurity
- Graduate Cyber Operations

Bachelor’s, Master’s, and PhD degrees
- Bachelor of Science (BS) in either Information Technology or Computer Science, Cyber Track
- Bachelor of Science (BS) in Interdisciplinary Studies (Strategic Policy), Cyber track [in development]
- Master of Science (MS) in either Cyber Operations or Information Technology, Cyber track
- Doctoral Degree (PhD) in Computer Science & Engineering, Cyber Operations track
- Research at all educational levels
Applied Learning Through UC Co-ops and Internships

Division of Experience-Based Learning & Career Education

- Currently, 53 faculty & staff including specialists in job development.
- Co-ops are undergrad experiences & available year-round.
- Academic internships are offered to any student not required to complete a co-op
  - paid or unpaid and may receive credit.
- UC partners with local, regional, national, and international firms from 31 countries.
- Salaries range from $11-$23 per hour.
Mandated UG Academic Co-ops

- UC has been offering co-ops since 1906 and is largest program at any public institution in the U.S.
- UG students alternate semesters of classroom study with semesters of paid, on-site career-related experience.
- Beginning during second year, three to five semesters of co-op are required in cyber-related fields of computer science, computer engineering, electrical engineering, and information technology as a graduation requirement.
  - Students complete 2-3 courses intended to help them focus on their academic & professional development.
  - Faculty advise & lead reflections after each co-op experience.
  - Co-op employers are asked to evaluate student development and performance.
Building Bridges with Industry

Increase in co-op opportunities for international students.
All UC International students seeking a co-op are eligible to legally work in the U.S. (F1/J1)

Partnering with the UC Co-op program is simple.
A business creates an ‘PAL’ account and posts a position. When resumes/portfolios from interested students have been received, the business will be notified to review.

PLACEMENTS PARTNERSHIPS
2017
Total Companies
1,192
Actively Hiring
768 (64%)
New Employers
269 (23%)
Academic Internships

- Prepares students for life after graduation.
- Work experiences look like a part-time job of 15 to 20 hours per week and is done in tandem with classes.
- Typically are one time, summer semester, on-site experiences.
- Two courses offered:

  *Exploring Academic Internships*
  Designed to prepare students to maximize learning through a career related internship and acquaint students with employer performance expectations.

  *Academic Internship Course*
  Investigates the applicability of students’ studies in relationship to the requirements of a corporate employer in the format of a part-time domestic or international field experience.
ROI for Business

• **Cream Of The Crop:** Upon graduation, approx. 95% of UC co-op students have jobs immediately upon graduation.
  – 75% receive job offers from their co-op employers

• **Find Future Employees:** Year round recruiting tool
  – ongoing pipeline.

• **Better Retention:** Co-op/Interns have significantly greater retention rates after five years when compared to outside hires.

• **Test-Drive:** The best way to evaluate a potential employee is through an co-op/internship.

• **Inspire Your Best Thinkers:** Co-op/Interns bring fresh ideas and can work with your best employees to explore new territory.
Recommendations for Best Practices

- Insure work being completed is meaningful to the business and the student.
  - Schedule meetings to review work and check-in with faculty advisors.

- Same hiring standards as Full-Time Employees.
  - Increase conversion rate from co-op/intern to employee.

- Be aware of academic requirements of students.
  - Provide some flexibility for exams and other academic requirements.
  - Be open to registering co-op/internship with student’s school.

- Incorporate students into the team.
  - Increase connections to the company.
  - Enriches experience for everyone.
Resources

- UC Co-op/Internships:
  https://www.uc.edu/careereducation.html
Q & A
Cooperative Education Model

Experiential Learning for Emerging Professionals:
Accelerate the learning process and better prepare students to enter the workforce prepared
to be “breach ready.”

CENTER FOR INFORMATION ASSURANCE & CYBERSECURITY
Project Timeline & National Expert Panel

> Research & Action

**WINTER 2016**
- Students interview for internships at T-Mobile
- Students enroll in a non-credit advanced certificate taught by cybersecurity practitioners
- Students attend Professional Development Seminars sponsored by T-Mobile

**SPRING 2017**
- CEM National Panel convenes in a face-to-face meeting
- Assessments deployed to capture student experience

**SUMMER 2017**
- First-phase model previews at the National Cyber Summit
- Assessments reported to CEM National Panel

**FALL 2017**
- CEM's first-phase report through the Western Region CRRC
- Student internships expand to additional companies
- Assessments deployed for students and companies

**WINTER & SPRING 2018**
- CEM National Panel reviews assessment results

**SUMMER 2018**
- CEM's second-phase report through the Western Region CRRC

CENTER FOR INFORMATION ASSURANCE & CYBERSECURITY
Expert Panel Theme

PANEL RESULTS & EMERGING THEMES
COOPERATIVE EDUCATION MODEL:
DEVELOP STUDENTS AS PROFESSIONALS

PROFESSIONAL DEVELOPMENT COMMUNITY
Seminar or online community of cybersecurity professionals and emerging professionals.

DEGREE PROGRAM
Enrollment in a formal undergraduate or graduate education program at an accredited institution. Ideal: knowledge units mapped to the CAE-CDE NSA-approved curriculum.

WORKPLACE EXPERIENCE
Cooperative learning or internship placement in a cybersecurity unit supervised by a working professional.

ADVANCED CERTIFICATE
Curriculum designed with the KBP Model* and led by cybersecurity professionals. Includes a Cyber-Lab for technical hands-on learning.

LEARNING
Guided
Independent

Exposure
COMPETENCIES
Demonstration

Source: *Kuzmina-Bespalko-Popovsky with Mbold, CEM Library
Corporate Perspective

T-Mobile – The UnCarrier
T-MOBILE

WINTER 2016

Students:
- interview and selected for internships at T-Mobile
- enroll in a non-credit advanced certificate taught by cybersecurity practitioners
- attend T-Mobile Professional Development Seminars

Student - receive career guidance and coaching from UW CIAC

<table>
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<tr>
<th>UW ISRM CERTIFICATE</th>
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<tbody>
<tr>
<td>Business context for cybersecurity</td>
<td>Risk Management</td>
<td>Solving Problems</td>
</tr>
<tr>
<td>NSA-Approved CAE-CDE® Coursework</td>
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Professional Development Seminar
Sponsored by T-Mobile

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<tr>
<th>T-MOBILE USA</th>
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<tr>
<td>Paid Capstone Experience</td>
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<tr>
<td>- UW Bothell Class Credit (optional)</td>
<td>Possible opportunity to hire-on</td>
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<td>Academic class</td>
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STUDENTS COMPLETE:
1. NSA-approved coursework
2. Professional Development Seminars
3. 6-months part-time work experience
4. Bachelor’s or Master’s Degree

CENTER FOR INFORMATION ASSURANCE & CYBERSECURITY
OUTCOMES Year 1 & Cumulative

DEMOGRAPHICS

TYPE OF STUDY

- 30% BUSINESS
- 70% COMPUTER SCIENCE/ENGINEERING

DEGREE LEVEL

- 30% POST BAC / MASTERS
- 70% UNDERGRADUATE

GENDER

- 40% MALE
- 60% FEMALE

- 30% BUSINESS / non-CS
- 70% COMPUTER SCIENCE/ENGINEERING

DEGREE LEVEL

- 30% POST BAC / MASTERS
- 70% UNDERGRADUATE

GENDER

- 45% MALE
- 55% FEMALE

1 U.S. Veteran

3 U.S. Veterans

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The need for Breach Ready Experts in your state:

Industry calls for greater career readiness by recent graduates, as well as increased numbers of emerging cybersecurity professionals.
Resources

> Information Security Risk Management Certificate

> Essentials of Cybersecurity
  – https://www.edx.org/professional-certificate/uwashingtonx-essentials-cybersecurity

> Coop Cybersecurity Education Library
  – http://www.uwb.edu/ciac/industry
Q & A
21st Century Apprenticeship and Cybersecurity
Joe Jenkins | Office of Apprenticeship
Apprenticeship is a **“Win-Win-Win”**

An industry driven method proven to attract, train and retain a highly skilled workforce

<table>
<thead>
<tr>
<th>Businesses and Industry</th>
<th>Educational Institutions</th>
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<tr>
<td>▪ Create Highly Skilled Employees</td>
<td>▪ Closer relationships with industry</td>
</tr>
<tr>
<td>▪ Increased Retention</td>
<td>▪ Articulation between apprenticeship and college programs ensures relevance and rigor</td>
</tr>
<tr>
<td>▪ Recruitment Tool</td>
<td>▪ Increased enrollment in credit classes by apprentices</td>
</tr>
<tr>
<td>▪ Attract women, minorities and veterans</td>
<td>▪ Access to Federal and State Resources</td>
</tr>
<tr>
<td>▪ Access to Federal and State Resources</td>
<td>▪ Fill Vacant Positions</td>
</tr>
<tr>
<td>▪ Fill Vacant Positions</td>
<td>▪ Earn-As-You-Learn</td>
</tr>
<tr>
<td></td>
<td>▪ College Credit and Certifications</td>
</tr>
<tr>
<td></td>
<td>▪ Acquire a skill that leads to a career</td>
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Apprentices
Apprenticeship Extending into New Sectors

Over 1,200 Apprenticeable occupations, including new and emerging growth industries

- Cybersecurity
- Financial Services
- Health Care
- Energy
- Advanced Manufacturing
- Information Technology
- Hospitality
- Biotechnology
- Aerospace
- Transportation
- Agriculture
### Core Components of Registered Apprenticeship

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Employer Involvement Is Integral</strong></td>
<td>Employer is the foundation for the RA program and must be directly involved and provider of on-the-job training</td>
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<tr>
<td><strong>Structured On-the-Job Training with Mentoring</strong></td>
<td>Minimum of 2,000 hours Structured and Supervised</td>
</tr>
<tr>
<td><strong>Related Training and Instruction</strong></td>
<td>144 hours recommended per year Parallel</td>
</tr>
<tr>
<td><strong>Rewards for Skill Gains</strong></td>
<td>Increases in skills brings about increases in earnings</td>
</tr>
<tr>
<td><strong>National Occupational Credential</strong></td>
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Extraordinary Individual Outcomes

91% of Apprentices are employed after their program. Average starting wage is over $50,000

Exciting Business Outcomes

An international study showed that for every dollar spent on apprenticeship training, an employer receives a benefit, on average, of $1.47 from reduced turnover to greater productivity

Impressive Public Benefits

Every $1 invested in Apprenticeship led to $27 in tax returns for the Government*
How does Apprenticeship Benefit Employers?

- Helps business develop highly skilled employees
- Increases retention rates and productivity, and lowers the cost of recruitment
- Direct Cost Savings to Company – hire apprentices at lower salaries - as skills increase, wages increase
- Diversify workforce – attract veterans, women and minorities
- Gives companies an edge over their competition
## How does Apprenticeship Benefit your Employees?

<table>
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<tr>
<th>Hands-on Career Training</th>
<th>Practical on-the-job training in a wide variety of occupations and industries</th>
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<tbody>
<tr>
<td>An Education</td>
<td>Hands-on and technical training which has the potential to earn college credits</td>
</tr>
<tr>
<td>Long-term Career and Greater Earning Potential</td>
<td>Following apprenticeship completion</td>
</tr>
<tr>
<td>Little/No Education Debt</td>
<td>Apprenticeship = College Without the Debt</td>
</tr>
<tr>
<td>National Credential</td>
<td>Upon graduation, a certified portable credential nationally recognized by industries and employers</td>
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</table>
How does Registered Apprenticeship Benefit Veterans?

Streamlining GI Bill Benefits for Apprentices

Through a partnership between the Departments of Veterans Affairs and Labor, employers now have a fast-track for their veteran employees to access their GI Bill benefits for registered apprenticeships.


Tax-fee Stipend
Allows Veterans to learn a skill while using their GI Bill benefits to receive a tax-free monthly stipend and is paid in addition to the wages earned as an apprentice.

Books and Supplies Funding
Classroom training whereby apprentices can receive money each month for books and supplies.
Why register your program with US DOL?

- Meet national standards for apprenticeship
  - Symbol of quality and excellence

- Connect with apprenticeship consultants
  - Technical assistance, link to partners and resources

- Access a range of federal and state benefits
  - Preferred status for WIOA (Workforce Innovation and Opportunity Act)
  - GI Bill benefits for qualified Veterans
  - Educational benefits (e.g., Pell grants, others)
  - State Tax Credits
National Apprenticeship Week 2017
November 13-19, 2017

1,000 Events
2017 Target

www.dol.gov/apprenticeship/NAW
DOL.GOV/Apprenticeship Resources

Quick-Start Toolkit

5 Step Format to take you from “exploring” to “launching” a Registered Apprenticeship Program.


Federal Resources Playbook

Guide to resources from various Federal Agencies to support Registered Apprenticeship.


DOL Registration Site

An electronic apprenticeship standards builder that allows potential new sponsors to build and register their program online.

http://www.doleta.gov/oa/registration/

RACC Site

Find information on becoming a RACC member and a database of college members and sponsors.

https://www.doleta.gov/oa/racc.cfm
Joe Jenkins
Office of Apprenticeship | jenkins.joseph@dol.gov
Q & A
Thank You for Joining Us!

Upcoming Webinar: Writing Cybersecurity Position Descriptions for the Greatest Impact

When: Wednesday, January 17, 2018 at 2:00pm EST

Visit the event website [here](https://nist-nice.adobeconnect.com/webinar-jan2018/event/registration.html) for more information.


[nist.gov/nice/webinars](nist.gov/nice/webinars)