



CYBERSECURITY CAREER PATHWAY

The work of the Talent Pipeline Task Force was inspired by our community's existing assets in the areas of education and workforce. Members consist of a diverse mix of employers, workforce development leaders, chambers of commerce, and postsecondary education and social service providers.

The Talent Pipeline Task Force – with grant support from Lumina Foundation – partnered with the Chicago-based Council on Adult and Experiential Learning (CAEL) to develop career pathways in core occupations and industries of high need in the three targeted sectors. The matching of education supply data and labor market needs were supported by CI:Now, CAEL, and SA2020.

Career pathways are designed from the ground up, with attention to foundational and essential skills at the entry level or in the early stages of the ladder. They also offer multiple entry and exit points, with the intent being that those who seek skills and a job in a pathway can do so while intentionally climbing an explicit career ladder.

Building on these career pathway documents, the Talent Pipeline Task Force recommends the following:

- 1) Embed career information into college advising; and
- 2) Align the messaging of K-12, higher education, workforce and community-based organizations, so that multiple audiences receive the same information about demand occupations and key entry points.

For more information and the full Talent Pipeline Task Force Report, visit www.SA2020.org/reports.

CYBERSECURITY CAREER PATHWAY

Developer Job Family			
Entry Points	Transition Points and Requirements		Wage Range
<p>Bachelor and Above Level (Senior and Above)</p>	<p>Qualifications:</p> <ul style="list-style-type: none"> Bachelors degree in Computer Science or related field (Master's degree preferred, or required for advancement to Senior-level positions) JavaEE, ASP.Net, Spring/Hibernate, AJAX, C#; JavaScript, Java; C, C++, UNIX/Linux; WinDbg/Wireshark/IDA-Pro/OllyDbg/Immunity/Python 		<p>Secure Application Developer Java Developer Cybersecurity Developer Web Developer</p>
FOUNDATIONAL SKILL SETS			
<p>Basic Math and Science Skills Multi-Tasking Equipment Usage/Monitoring</p>	<p>Data Analysis & Processing Highly Organized Quality Control Analysis</p>	<p>Time Management Computer/Network Defense Skills Supervisory Skills</p>	<p>Mechanical Skills Attention to Detail Troubleshooting Skills</p>
ESSENTIAL SKILL SETS			
<p>Punctual and Efficient Adaptable and Flexible Responsible</p>	<p>Drug-Free Able to work with teams Self-Motivated</p>	<p>Well-Groomed Able to communicate clearly Honesty and Integrity</p>	<p>Positive Attitude Conflict Resolution Self-Control</p>

Entry Points	Job Title	Job Description	Education/ Training	Approximate Wage
Bachelor and Above Level (Senior and Above)	Cybersecurity Developer	Responsible for solving hard problems, prototyping developing, and analyzing components and end-to-end systems at the embedded-system, mobile, host, network and enterprise levels.	Bachelor's degree in Computer Science or related field; plus 5 years experience	\$90,000
	Java Developer	Creates user information solutions by developing, implementing and maintaining Java-based components and interfaces. Designs and develops user interfaces to internet/intranet applications, recommends system solutions, integrates applications, and supports users by developing documentation and assistance tools.	Bachelor's degree in Computer Science or related field; plus 5 years experience	\$93,000
	Secure Application Developer	Independently execute small web application development projects, lead portions of large web application development projects and communicate clearly regarding progress and status of tasking. Ability to support sales efforts with technical expertise, deliver internal presentations or training courses.	Bachelor's degree in Computer Science, Computer Engineering, Electrical Engineering or related field; minimum 5 years experience	\$100,000
	Web Developer	Responsible for internal web development and design, data warehouse management, design, implementation and continuous maintenance and support of various network asset discovery data repositories.	Bachelor's degree, plus relevant experience; PERL, Python, Ruby (general scripting); PHP, HTML, JavaScript, JQuery (web scripting); C, C++, VC++ (programming); MySQL	\$79,000

CYBERSECURITY CAREER PATHWAY

Engineer/Architect Job Family		
Entry Points	Transition Points and Requirements	Wage Range
Bachelor and Above Level (Senior and Above)	Qualifications <ul style="list-style-type: none"> Bachelors degree, plus several years relevant work experience Cisco, CCNA Security; Visio; CompTIA; Microsoft Certified Solution Developer; Certified Systems Architect; FISMA, SolarWinds, Cacti 	Computer Systems Engineer/Architect Network Security Engineer \$76,000-\$93,000

FOUNDATIONAL SKILL SETS

Advanced Mathematical Skills Multi-Tasking Equipment Usage/Monitoring	Data Analysis & Processing Highly Organized Quality Control Analysis	Time Management Computer/Network Defense Skills Supervisory Skills	Mechanical Skills Attention to Detail Troubleshooting Skills
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ESSENTIAL SKILL SETS

Punctual and Efficient Adaptable and Flexible Responsible	Drug-Free Able to work with teams Self-Motivated	Well-Groomed Able to communicate clearly Honesty and Integrity	Positive Attitude Conflict Resolution Self-Control
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Entry Points	Job Title	Job Description	Education/ Training	Approximate Wage
Bachelor and Above Level (Senior and Above)	Computer Systems Engineer/ Architect	Design and develop solutions to complex applications problems, system administration issues or network concerns. Perform systems management and integration functions. Communicate with staff or clients to understand specific system requirements, collaborate with engineers or software developers to select appropriate design solutions or ensure the compatibility of system components.	Bachelor's degree, plus several years experience. CompTIA, Microsoft Certified Solution Developer; Certified System Architect	\$93,000
	Network Security Engineer	Design, develop, implement, and maintain the network, security and communication infrastructure. Performs advanced complex network analysis, identifies problems and design solutions; performs routine system administration and maintenance on local or remote locations. Configure multiple models and vendors of switches/routers, including VLAN configuration, routing protocols	Bachelor's degree, plus 4 years experience Cisco CCNA Security certification; Visio, experience with FISMA, SolarWinds, Cacti	\$76,000

CYBERSECURITY CAREER PATHWAY

Consultant/Manager Job Family

Entry Points	Transition Points and Requirements	Wage Range
Bachelor and Above Level (Senior and Above)	<p>Qualifications</p> <ul style="list-style-type: none"> • Bachelors degree, plus several years relevant work experience • Cisco, CCNA Security; Visio; CompTIA; Microsoft Certified Solution Developer; Certified Systems Architect; FISMA, SolarWinds, Cacti <p>Application Development Consultant Business Development Manager Application Security Consultant Information Security Consultant Information Technology Manager</p>	<p align="center">\$63,000- \$81,000</p>

FOUNDATIONAL SKILL SETS

<p>Advanced Mathematical Skills Multi-Tasking Equipment Usage/Monitoring</p>	<p>Data Analysis & Processing Highly Organized Quality Control Analysis</p>	<p>Time Management Computer/Network Defense Skills Supervisory Skills</p>	<p>Mechanical Skills Attention to Detail Troubleshooting Skills</p>
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ESSENTIAL SKILL SETS

<p>Punctual and Efficient Adaptable and Flexible Responsible</p>	<p>Drug-Free Able to work with teams Self-Motivated</p>	<p>Well-Groomed Able to communicate clearly Honesty and Integrity</p>	<p>Positive Attitude Conflict Resolution Self-Control</p>
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Entry Points	Job Title	Job Description	Education/ Training	Approximate Wage
Bachelor and Above Level (Senior and Above)	Application Development Consultant	Consult with customers, consultants, program managers to understand and analyze operational procedures, information requirements, transaction processing, utilization and/or reporting needs. Design innovative software applications, develop testing software to assess system functionality. Develop and maintain technical documentation on computer based information systems, compile documentation for design changes or creation criteria.	Bachelor's degree in Computer Science or related field. JavaScript, ASP.NET, JavaEE, C#, Java, AJAX, ASP.NET	\$61,000
	Application Security Consultant	Responsible for the execution and delivery of planned project deliverables and milestones that assist clients in learning, understanding, and applying secure software development methodologies. Engages in code review/secure code analysis, web application penetration testing, with an understanding of Software Security Architecture and Design.	Bachelor's degree in Computer Science, Engineering, or related field. Master's preferred CISSP or other security certifications; Java/J2EE, .NET programming	\$63,000
Bachelor and Above Level (Senior and Above)	Business Development Manager	Create and drive business relationships from account planning through client satisfaction. Should enjoy working in a technically challenging environment and is able to formulate strategy and execute tactical account plans.	Bachelor's degree, plus 7+ years experience in the professional services and technology solutions area	\$74,000
	Information Security Consultant	Provides advisory and technical support to help clients improve the Information Risk and Security Management functions. Provide information security subject matter expertise and utilize business consulting acumen to work collaboratively with clients to design build and implement pragmatic security solutions.	Business, computer, or related technical degree, 2-5 years relevant network administration, information security or technical IT audit experience; consulting experience preferred. CISSP, GIAC, MCSE, CCSE, CCSP, TICSA	\$74,000

	<p>Information Technology Manager</p>	<p>Maintains information technology strategies by managing staff, researching and implementing technological strategic solutions. Directs technological research by studying organization goals, strategies, practices and user projects. Includes role of the Network and Computer Systems Administrator</p>	<p>Bachelor's degree in computer science or related field; master's degree preferred. CISSP, CEH, GIAC</p>	<p>\$81,000</p>
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CYBERSECURITY CAREER PATHWAY

Industrial Networks/Control Systems Job Family

Entry Points	Transition Points and Requirements	Wage Range
Bachelor and Above Level (Senior and Above)	<p>Qualifications:</p> <ul style="list-style-type: none"> Bachelor's degree in Electrical Engineering, Computer Science, Electrical Engineering, Information Systems. 3-7+ years relevant work experience. SCADA, DAS, PLC, HMI programming; Working knowledge of Cisco IOS, Java, Exceed, Unity pro XL, RS Logix 5000, WS 	<p>Protection & Control Relay Technician IT Auditor Controls Engineer SCADA Engineer Scheduler Pipeline Project Engineer Controls Automation Engineer Control Systems Analyst Sr. Electrical Engineer</p>
Associate Level (Mid to Senior)	<p>Qualifications:</p> <ul style="list-style-type: none"> Associate's degree in Engineering, Electronics or Instrumentation Technology; min 2 years experience in a related position 	<p>Field Service Technician-Remote Automation</p>
Certificate Level (Entry to Mid)	<p>Qualifications:</p> <ul style="list-style-type: none"> High school diploma or equivalent; 1-5+ relevant work experience. SCADA, DAS, AutoCAD/Electrical Design, HMI programming, Debugging/Testing/Commissioning 	<p>Inverter Technician Protection & Control Relay Technician Control Room Operator I SCADA Technician/Specialist O&M Solar PV Technician Junior Controls Specialist</p>

FOUNDATIONAL SKILL SETS

Basic Math and Science Skills Multi-Tasking Equipment Usage/Monitoring	Data Analysis & Processing Highly Organized Quality Control Analysis	Time Management Computer/Network Defense Skills Supervisory Skills	Mechanical Skills Attention to Detail Troubleshooting Skills
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ESSENTIAL SKILL SETS

Punctual and Efficient Adaptable and Flexible Responsible	Drug-Free Able to work with teams Self-Motivated	Well-Groomed Able to communicate clearly Honesty and Integrity	Positive Attitude Conflict Resolution Self-Control
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Entry Points	Job Title	Job Description	Education/ Training	Wage Ranges
Bachelor and Above Level (Senior and Above)	Controls Automation Engineer	Complete engineering design, testing and commissioning of facility instrumentation and control systems. Perform engineering tasks using established procedures, automation and SCADA project planning, scheduling and budgeting based upon project commissioning and start-up schedule. Generate system architecture and automation network drawings, provide guidance and training assistance to employees.	Bachelors in Electrical Engineering, Control Systems or Instrumentation. Minimum 3 years relevant work experience; SCADA and other software, operating systems and equipment knowledge.	\$70,000-\$80,000
	Controls Engineer	Coordinate equipment maintenance and systems integration; prepare documentation and lead compliance to a planned maintenance program. Troubleshoot machines and equipment, program robots to meet system requirements, manage/lead maintenance resources performing maintenance and repairs.	Bachelor's degree in Engineering or Engineering Technology OR at least 7 years of job-related experience. Previous experience with PLC/HMI programming.	\$76,000
	Control Systems Analyst	Responsible for designing, programming, implementing and maintaining Industrial Control Systems (Supervisory Control and Data Acquisition (SCADA) and Distributed Control System (DCS)) including troubleshooting, installing and upgrading all related system components. Research, analyze and recommend implementation of software or hardware changes to rectify network deficiencies or enhance network performance.	Bachelor's degree in Computer Science, Engineering or a related field. Three years' SCADA/DCS related system administration and programming experience to include PLC programming in Function Block and Ladder Logic. Working knowledge of Cisco IOS, Java, Exceed, Unity pro XL, RS Logix 5000, Concept, Wireshark, Putty, WinSCP, and WS FTP.	\$59,000-\$88,000

	IT Auditor	Reviews and tests controls in IT system and functions to ensure the security and integrity of company information assets and continuity of operations. Examines automated systems and information technology, performs examinations and appraisals of IT systems and operating controls and procedures.	Bachelors degree in Information Systems, Computer Science, Accounting or Finance Minimum 3 years internal auditing experience, including one year experience in IT Audit. Knowledge of operating systems, databases and application security, Refinery Process Control Networks, SCADA and/or IT Security Frameworks (NIST, ISO27000, SANS)	\$66,000
	Pipeline Project Engineer	Primarily responsible for performing duties such as Right of Way and permitting, land acquisition, truck unloading, pipeline custody transfer, instrument and controls (SCADA), electrical power, hydraulics, pumping stations, tankage, PFD/P&ID review, estimates and schedules.	Bachelors degree in Engineering or related field. 5-7+ years pf Pipeline Project experience required.	\$88,000
	SCADA Engineer	Main duties of a SCADA Engineer include software development for SCAHA HMI software and SCADA Building Management Systems (BMS) software. Other duties include updating Control System Wiring diagrams and Network Interconnect Diagrams, calibrating and troubleshooting instrumentation deployed in the SCADA system.	Bachelors degree in engineering, computer science, or a software-related discipline. 5+ years of hardware/software SCADA design experience Relevant experience with GE Fanuc PLCs, GE Human Machine Interface (HMI) software, Red Line Data Concentrators and Johnson Controls BMS software	\$70,000-\$80,000
	Scheduler	Nominate schedules, confirm and monitor flow and imbalances from receipt points to delivery points on the pipeline system; verify volumes directly with operations and/or through monitoring SCADA. Track volume	Bachelors degree in related field, or experience in lieu of degree. 2+ years directly related	\$30,000-\$40,000

		requirements, communicate with operations to ensure flow rates are consistent with pipeline capabilities.	experience in either natural gas scheduling or other natural gas business activities of marketing or purchasing.	
	Sr. Electrical Engineer	Work with/for NuStar project managers, operations, maintenance, and communication. Supervise contract personnel, engineering firms, integrators, vendors and/or electrical contractors as needed. Oversee PLC logic, HMI screens, field commissioning, training, as-built documentation, project close-out. Evaluate, properly apply and provide training for vendor's products.	Bachelors degree in Electrical Engineering Minimum 5 years of electrical/instrumentation/controls (EIC) engineering and project management experience. PLC, network, and HMI systems knowledge. Piping and Instrument Diagram experience.	\$88,000
Associate Level (Mid to Senior)	Field Service Technician-Remote Automation	Install, calibrate, test, inspect repair and maintain flow computers and associated instruments, and telemetry systems associated with SCADA host systems. Respond to emergency 24/7 call by phone or on-site as appropriate and requested. Provide training to customers' employees and advise them of proper procedures to use flow computers and associated instrumentation.	Associate's degree in Engineering, Electronics or Instrumentation Technology. Minimum 2 years experience in a similar service position involving flow computers, telemetry, analyzers and PLCs.	\$60,000-\$70,000
	Control Room Operator I	Monitor and control pipeline systems, rail loading/loading, truck and marine terminal loading and unloading. Supports and troubleshoots the pipeline control systems in order to notify the SCADA/Automation group of required modifications. Monitors and coordinates with Product Supply schedulers, refinery blend operations and pipeline partners. Responds to all emergency conditions on the pipeline control system, make prior notifications and completing documentation. 24/7-365 day operation.	High school diploma or GED required; Bachelors degree preferred. One (1) year experience in pipeline, marine, truck, rail terminal or pipeline control room operation required. Minimum three months of console operation under direction of trainer.	\$60,000
	Inverter Technician	Commission, test, analyze, and repair Photovoltaic Inverters and monitor DAS/SCADA Systems, as well as other components of solar PV power facilities. Coordinate on-site planning, installations, commissioning, quality inspections, and perform testing of inverters. Regularly work	High school diploma or equivalent required; Associate's degree or technical certification in related technical field preferred.	\$46,000

Certificate Level (Entry to Mid)		with high voltage DC electricity, three phase power, SCADA or third party monitoring and the relevant software and firmware of the KACO inverters & site equipment.	3-5 years of inverter experience and a certified electrician (solar technology); 3 years experience in electrical, electronic and/or network communications. SCADA/DAS communication knowledge.	
	Junior Controls Specialist	Provide quote assistance, materials procurement, budgeting. Work on various sections of Automation and Controls projects (PLC Programming, AutoCAD, HMI Design).	High school diploma or equivalent. Minimum 2 years experience, plus Electrical/Computer Technologist Certificate Programmable Logic Controller experience, AutoCAD/Electrical Design, HMI programming, Debugging/Testing/Commissioning experience.	\$64,000
	O&M Solar PV Technician	Provide all aspects of on-site installation, repair, maintenance, and modifications of solar power systems for residential and commercial customers. Duties include monitoring operations, commissioning, testing, inspecting, troubleshooting, repairing, and modifying AC and DC solar PV systems, including inverters, PB module arrays, transformers, switchgear, trackers and metering systems.	High school diploma or equivalent required; Associate's degree preferred. 1-3 years experience of demonstrated experience operating and maintaining low and medium pressure industrial hydraulic systems. Industry/OEM certification for operations and/or maintenance of systems; working knowledge/certifications of power generation equipment controls and SCADA systems.	\$40,000-\$50,000

	<p>Protection and Control Relay Technician</p>	<p>Perform installation, commissioning, testing and maintenance of protective relaying equipment, relaying schemes, DFR equipment, SCADA systems, distribution automation system and associated communication equipment. Assist in developing written standard commissioning, testing, and maintenance procedures for protective relaying, DFR's, RTU's, IED's, Distribution Automation and associated communication systems.</p>	<p>High school diploma or equivalent, plus training from technical school, apprenticeship or armed services.</p> <p>OR Bachelor's degree in Electrical Engineering or Electrical Technology</p> <p>5 years related experience in the areas of transmission line and substation protective relay control system and SCADA/Automation</p>	<p>\$60,000-\$75,000</p>
	<p>SCADA Technician/Specialist</p>	<p>Operate Cygnet SCADA software, create new data acquisition devices, develop web-accessible screens to data viewing and remote data entry, ensure proper alarms are sent correctly and promptly. Route data for use in production accounting, collect gas measurement data from field devices through Cygnet, monitor oil pipeline data for variances and leaks.</p>	<p>High school diploma or equivalent; minimum 4 years of journey level experience in electrical systems and electronic instrumentation installation, maintenance and repair; 1 year experience with programmable logic controllers.</p> <p>Electrical contractor's license, SCADA knowledge, National Electrical Code knowledge, National Fire Protection Association.</p>	<p>\$50,000-\$60,000</p>