National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K1	Linux / Unix OS	Current within 3 years, as of now the operating system of the IoT	13	2			3.9
K2	Windows Server OS	Current within 3 years, need this background for AWS and Azure	2	12	1		3.1
K3	Operating System Maintenance	Includes topics such as account mgmt, installing apps, command line, directory, file structures, os scripting, config modification, backup/restore, os admin, scheduler, stopping/starting services, change control, documentation, awareness of KPI and SLA/OLA, log files and patches, ACL.		15			3.0
K4	OSI Model	Layer 1: physical layer Layer 2: data link layer Layer 3: network layer Layer 4: transport layer Layer 5: session layer Layer 6: presentation layer Layer 7: application layer Provide basic framework for how it all works, including how cloud computing has impacted the conceptualization of the seven layers. Plus and awareness of IP multimedia services. Understand that OSI is the framework for all problem solving and troubleshooting	15	1			3.9

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K5	**Enterprise Mobility and Collaboration**	Collaboration Technologies - Making enterprise mobility work. A basic understanding of the building blocks for how enterprise mobility operates. Also an awareness of the security requirements. * PSTN * messaging * VOIP * videoconferencing * Bluetooth * presence Enterprise Mobility - Applying collaboration technologies to solve business problems. Operational-level proficiency to install, use, configure, operate from a user viewpoint. Understand domain and relevance. Case studies. * messaging * use VOIP * Skype-like * videoconferencing * Bluetooth * presence * MDM	7				4.0
K6	**Network Devices-Connectivity Components**	Includes such topics as NICs, Switches, Routers, Gateways, Cables and connectors, WAPs, DTE, CTE, modems, sensors, wireless LAN controllers (includes teaching MAC and ARP). General knowledge for entry level IT position. * Note: This runs on K5 "Collaboration Technologies" above - K6, K7, and K8 will be merging together over time.	15	1			3.9
K7	**WAN Technologies**	Includes such topics as packet and circuit switching, T and E carrier systems for data communication, multiplexing and concentrating, =Synchronous Digital Hierarchy, etc., SDN/open flow, PRI ISDN, MPLS; SIP and Web RTC protocols. * Note: this runs on K5 "Collaboration Technologies" above - K6, K7, and K8 will be merging together over time.	5	8	2		3.2

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K8	**Wireless Infrastructure and WLANs**	Includes such topics as cellular telephone, Personal area networks, Satellite data communications, microwave point to point, Broadband Mobile access/LTE, Wireless spectrum, Wireless IEEE 802 standards, near-field communications, WiFi, Bluetooth. Focus on enterprise wireless solutions (i.e. Cisco, Aruba, Ruckus), not carrier wireless. * Note: this runs on K5 "Enterprise Mobility and Collaboration" above - K6, K7, and K8 will be merging together over time.	4	8	2		3.1
K9	**Troubleshooting**	May include use of diagnostic software (such as cloud-based monitoring, listening, and remediating systems - e.g. Data Dog and New Relic and VictorOps) and use of hardware including hand tools as well as knowledge of troubleshooting methodology, critical thinking, situation assessment, documentation, inspection routines, fiber and fiber splicing awareness. Understand the scope and details of the problem (and how to gather/analyze that data); understand error messages (and how to research them); use correct data for decision-making; apply the OSI model to troubleshoot (to apply the right tools to the right layer); employ communicaton and collaboration "soft skills" to resolve problem in a stressful, high-pressure environment; and demonstrate openness and transparency (i.e. don't hide mistakes). Consider hands-on troubleshooting and real-time solutions of unknown problems.	13	1			3.9

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K10	**Infrastructure Monitoring and Restoration**	Includes such topics as backup and recovery, centralized log monitoring and correlation, types of alarms, network monitoring and provisioning software, fault tolerance, mass storage and backup devices, network and computer system redundancy including storage, power, connectivity and hot swapping, disaster recovery planning, business continuity, MDM (mobile device management) exposure but not required, sensors, automated tools (e.g. HP OpenView, SolarWinds, SystemCenter), optimizing performance. This should cover both physical and virtual infrastructures - students need hands-on in either physical or virtual or their education is incomplete	6	8			3.4

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K11	Network Security	Includes at least overview knowledge of topics such as knowledge of firewalls, password practices and procedures, encryptions, network virus protection, anti-theft and tamper proof devices, biometrics, security protocols, SSL, IPSEC, WPA2, SSH, Security tools, Trojan horses, DMZ, hack attacks, social engineering, public, private, symmetric, and secret keys, virus, worm, honeypot, and backdoor concepts, digital certificates, physical security, authentication, vulnerability scanners, intrusion detection systems, ACL, risk analysis, information security, data security, VPN. Consider covering all domains from CISSP certification.	14				4.0
		Basic hardening do's and don't's					
		Certificate management					
		DNS					
		Application interactions					
		Managing environments at scale					
		Configuration management					
		Password management					
		Change control process					
		Staying current with security advisories (how/where to find them)					
		Concept of network security should be woven into all other IT courses; take a moment at key points in all curriculum to ask "Is this secure? Why or why not?" and "What would you do to make it more secure?"; add to the class tests these questions, concepts, and elements - build it up, open it up, secure it.					
K12	Virtualization Technologies (Network Function Virtualization NFV)	Conversational awareness (non vendor specific) of such topics as installation/configuration of server and desktop virtualization solutions, management of virtualization solutions, administer/install/patch/recovery, virtual network and hypervisor configuration and optimization, identify solution. This should also include a high level of cloud. Understand difference between server virtualization and network virtualization. May fade over time with the rise of automation.	12	2			3.9

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K13	Data Management	Includes such topics as evaluation of storage architectures such as DAS, SAN, NAS, CAS; understanding backup, recovery, disaster recovery, business continuity, and replication; understanding logical and physical components of an information storage infrastructure, tiered storage; storage as a service.	9	3	1		3.6
K14	Cloud and Cloud Services	Understanding what the cloud is, what are public/private cloud services, what is in a hybrid cloud, and what are the challenges and difficulties of using the cloud (including business requirements). Plus also awareness of mashups and API (application programming interface). Understanding the role of cloud architect; architects must master fundamentals that sit "below" the cloud. Includes such topics as server virtualization as a service, desktop virtualization as a service, storage virtualization as a service, I/O virtualization as a service, security in the cloud, awareness of and exposure to different "X as a service" aaS types (differences between them). Consider a hybrid cloud solution (i.e. RFP to real-world business problems) as a capstone project.	14				4.0
K15	Soft Skills	Oral Communication, written communication, leadership, teamwork and collaboration, appreciation of diversity, conflict management, customer service, work ethic, professionalism, integrity, attention to detail, adaptability, organization, stress management, multi-tasking, problem solving, decision-making, intellectual risk-taking, thoughtful reflection, initiative, creativity, dedication, perseverance, pride in work, numerical and arithmetic application, following directions, information gathering, resource allocation, time management, technology and tool usage, critical thinking, willingness to continue learning, technical writing, presentation Soft skills should be threaded into every course and perhaps called out on the syllabus for emphasis.	14				4.0

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
K16	**Basic Project Management**	Basic understanding of principles including the individual's role in the process, accountability. Specifically, PMLC, ITIL, and SDLC as a framework of understanding	8	2	1		3.6
K17	**Script Automation and Application Programming Interfaces**	Global automation in a single push; writing, executing and debugging (Python, Java, etc). This can be a differentiator: understanding the basics/benefits of combining scripting and API will help students. Open source is one cost/free approach. This is used throughout all of the Ks above. Team building, project management, and time management concepts interwoven into classes likely through projects - ideally, each student has a different job working toward a common goal. (Don't wait until the final capstone to address these.)	11				4.0
	Certifications to Consider	Certifications show deeper level of interest, commitment, and follow-through, but can also help job applicants get past HR gatekeeprs and passed along to the hiring manager. They are "door openers."					
C1	**A+ Certification**						
C2	**Network+ Certification**						
C3	**Security + Certification**						
C4	**CCNA Certification**						
C5	**CISSP/SSCP**						

Acronym Glossary

aaS (K14) as a service

ACL (K3, K11) access control list

API (K14, K17) application programming interface

ARP (K6) address resolution protocol

AWS (K2) Amazon Web Services

BILT business and industry leadership team

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
	CAS (K13) content-addressable storage						
	CCNA (Cs 5-7) Cisco Certified Network Associate						
	CISSP (Cs) Certified Information Systems Security Professional)						
	CTE (K6) computer telephony engine						
	DAS (K13) direct-attached storage						
	DMZ (K11) demilitarized zone, or perimeter network						
	DNS (K11) domain name system						
	DTE (K6) data terminal equipment						
	I/O virtualization (K14) input/output virtualization						
	IEEE (K8) Institute of Electrical and Electronics Engineers						
	IPSEC (K11) internet protocol security						
	IoT (K1) Internet of Things						
	ISDN (K7) integrated services for digital network						
	ISO (header) International Organizatio for Standardization						
	ITIL (header and K16) Information Technology Infrastructure Library						
	KPI (K3) key performance indicator						
	LAN (K6) local area network						
	LTE (K8) long-term evolution (4G wireless)						
	MAC (K6) media access control						
	MDM (K5, K10) master data management						
	MPLS (K7) multiprotocol label switching						
	NAS (K13) network-attached storage						
	NICs (K6) network interface controller						
	OSI model (K4, K9) open systems interconnection						
	PMLC (K16) project management life cycle						
	PRI (K7) primary rate interface						
	PSTN (K5) public switch telephone network						
	RFP (K14) request for proposal						
	SAN (K13) storage area network						
	SDN (K4, K7) software-defined networking						

National Business and Industry Leadership Team (BILT) Knowledge Domains - updated August 2017

* Skills for an entry-level IT worker looking for a job 2-3 years from Fall 2017.

* Be sure ITIL (change management and root/cause analysis) elements are covered as needed in every course. ISO 9000/9001 Quality Management criteria.

* Consider on-site tours.

KSA	Knowledge, Skill, Ability	Topics	# votes (4 = most important)				
			4	3	2	1	Avg
	SDLC (K16) systems development life cycle						
	SIP (K7) session initiation protocol						
	SLA/OLA (K3) service-level agreement, operational-level agreement						
	SSCP (Cs) System Security Certified Practioner						
	SSH (K11) secure shell						
	SSL (K11) secure shell						
	T&E (K7)						
	VoIP (K5) voice over IP						
	VPN (K11) virtual private network						
	WAN (K7) wide area network						
	WAP (K6) wireless access point						
	Web RTC (K7) real time communications						
	WLANs (K8) wireless local area network						
	WPA2 (K11) Wi-Fi Protected Access 2						