ANIXTER UNIVERSITY™

Q2 2018

ABOUT ANIXTER UNIVERSITY

Anixter University™ is a unique educational institution that offers an array of technical and standards-based information for contractors, integrators, end users and consultants. Based on best practices gained through decades of experience, Anixter University organizes its technology curriculums into colleges, and each college contains courses of varying technical levels.

Courses are tailored to suit our customers' learning requirements and are delivered in a straightforward, unbiased way.

Anixter University courses are provided at no cost and most courses are certified for BICSI Continuing Education Credits.

To view more course details or to register for an on-demand class, visit anixter.com/university.

CONTENTS

COURSE FORMATS

Anixter University courses are delivered online in an interactive, on-demand format and address real-world problem solving in the markets that Anixter serves. Each college course is labeled with a level number indicating the degree of technical information contained in the course. The Level 100 courses are considered prerequisites to be completed prior to higher-level courses.

The online courses may be accessed from this web page: Anixter.com/university. The length of each online course is listed in its description in this catalog. Once a student enters a course, it is possible to exit the course before completing it and return to the same place in the course at a later time. Each course has a graded quiz at the end which must be completed with an 80% passing score to obtain a completion certificate for CEC eligibility.

Most of the courses offered are accredited with Continuing Education Credits (CECs) from BICSI and other professional organizations that can be used to aid attendees in maintaining their professional certifications. Each course description lists the associated CEC information for which the course is qualified.

Additional details:

- Most of the courses last approximately 60 minutes.
- Courses contain knowledge check questions to reinforce the concepts discussed.
- The completion certificate must be submitted by the student to request that the CECs be applied to the student's professional organization transcript.

Anixter University courses are also available for presentation to larger groups via Skype Web conference or in person at the customer's site. For more information about live course presentations, please contact your Anixter sales representative.

ANIXTER UNIVERSITY FACULTY

Anixter University's faculty is comprised of members of Anixter's Technology Support Services group. Faculty members carry various academic degrees and professional certifications such as network design and administration, electrical engineering, project management, BICSI Registered Communications Distribution Design (RCDD), DC Professional Data Center Practitioner (DCP), and ASIS Physical Security Professional (PSP) and Certified Protection Professional (CPP) certifications. All members of the faculty attend frequent ongoing training sessions within the industry to make sure they are up to date with the latest standards and technology knowledge.

INTERNATIONAL STANDARDS PARTICIPATION

Members of the Technology Support Services group sit as voting members and represent Anixter on various international standards committees including IEEE, TIA, ISO/IEC, CENELEC and ONVIF. With detailed knowledge of the latest standards developments, Anixter University's faculty is able to discuss with customers plans for current and future technology solutions.

In addition to participating as voting members in the standards organizations listed above, many members of the Anixter University faculty monitor or attend the meetings and forums of other standards organizations such as ASTM, UL, ICEA, NEMA, NFPA, ISA, CCCA, CSIA, SAE, ANCE and VDE. This involvement allows the faculty members to offer assistance on interpreting and implementing regulatory standards as well as reviewing and revising engineering specifications.

COURSE CATALOG

Data Center College

Data Center College is designed to help an organization understand the various types of solutions available for current and future data center infrastructure issues. The content of these courses focuses on standards based best practices for the Data Center are provided by members of Anixter's Technical Support Services Group. These technical professionals hold various relevant academic degrees and industry certifications including, but not limited to, network design and administration, electrical engineering, BICSI Registered Communications Distribution Design (RCDD), DC Professional Data Center Practitioner (DCP), and ASIS Physical Security Professional (PSP) and Certified Protection Professional (CPP) certifications.

Who should attend?

The courses in Data Center College address the training and educational needs of contractors and installers, as well as the design and operational concerns of end-user or owner/operator organizations that are in charge of some or all of the aspects of a typical data center. Anixter recommends that representatives within each data center discipline (e.g., data center manager, facilities, network, cabling, server and SAN) complete all of the available courses in order to gain an understanding of the interdependent nature of virtually all decisions that are made within the data center.

COURSE DESCRIPTIONS

Data Center Design Standards and New Technologies – Level 100

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This is the first course in the Data Center Design sequence. It examines the general categories of data center types and the relevance of various applicable global standards and best practices. This course introduces the following topics:

- Trends within the data center industry
- Types of data center operations
- Global design standards and best practices (TIA, BICSI, ISO/IEC, CENELEC)
- Computing floor network technologies
- Computing floor architecture trends

Upon completion of the course, students will have an understanding of the overall standards and infrastructure considerations that are necessary to design, implement and maintain a data center. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Data Center Infrastructure Design and Management – Level 100

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This is the second course in the Data Center Design sequence. The course content examines at a primary level topics that are key to the overall efficient operation and management of data centers. The course includes the following topics:

- Power system optimization in the data center
- Thermal efficiency within the computing floor space
- Enabling data center infrastructure management (DCIM) tools

Upon completion of the course, students will have an understanding of the overall standards and infrastructure considerations that are necessary to design, implement and maintain a data center. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Cabling Infrastructure Standards, Technology and Design – Level 100

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This course includes a discussion about the options for copper and fiber cabling within the data center. It covers the relevant infrastructure and electronics standards as well as insights into the emerging technologies that affect the demands that will be placed upon the cabling infrastructure in the future. There are a variety of cabling architecture options for copper and fiber infrastructure in a data center. This course covers the pros and cons of the various cabling architecture options in order to help the student make the best cabling decisions. The topics covered in this course include the following:

- Global standards and best practices for cabling infrastructure design
- Network architecture implications on cabling infrastructure design
- Cable pathway options
- Copper cabling technologies, options and nomenclature
- Fiber optic cabling options and technologies
- Planning for network monitoring in fiber optic design
- Emerging technologies in fiber optic networking

Upon completion of this course, students will understand the standards-based architectures and transmission media that are available for today's data center cabling infrastructure. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Telecom Grounding (Earthing) in the Data Center – Level 200 (BICSI CEC: 1)

AVAILABLE Q2 2017

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This course examines a low-profile area of the data center that has garnered little attention at the implementation and operation level in North America. A data center telecom grounding system that is properly designed, installed and maintained improves network performance and reliability and protects valuable network equipment and personnel. This course will discuss the purpose of grounding, the practical applied theory behind grounding, and the detrimental effects of improper grounding and key elements of grounding standards. The topics covered in this course include the following:

- Global telecom grounding (earthing) standards and best practices
- Grounding system theory
- Basic system requirements
- Subsystem requirements and best practices
- Detrimental effects of improper grounding (earthing)
- Electrostatic discharge (ESD)
- Quality components for a complete system

Upon completion of this course, students will understand the purpose of telecom grounding and how to apply the proper grounding specifications and best practices that are included in the applicable global standards (TIA, IEEE, ISO/IEC, CENELEC, etc.). This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Principles and Fundamentals of Power Distribution – Level 100 (BICSI CEC: 1)

Duration: 85 Minutes – On Demand for Individuals or Skype Webcast for Groups

This course discusses the significant growth in data center power consumption and the ongoing increase in server densities. These dynamics make it necessary to understand the various power distribution options available from current and emerging technologies. This course illustrates how to configure a power distribution system for modern-day data centers as well as options for the future. The topics covered in this course include the following:

- Industry trends in power use and consumption
- Basic power terminology
- Global power distribution architectures and trends
- UPS technologies
- Power distribution technologies and architectures in the data center

Upon completion of this course, students will understand the available power distribution architectures and components that are available and their relevance to data center operation. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Principles and Fundamentals of Thermal Management – Level 100 (BICSI CEC: 1)

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This course focuses on the demands that the ever increasing complexity of data center installations place on the thermal management infrastructure of the data center. The course will examine legacy thermal management issues and will discuss a variety of solutions that can be applied to various data center environments to solve the challenges presented by the increasing density of data center electronics. The presentation of general principles of thermal dynamics will help the students understand many of the thermal management situations that present themselves in a typical data center. The topics covered in this course include the following:

- Understanding of general principles of thermal dynamics
- Origin of thermal challenges in the data center
- Thermal management techniques at various infrastructure levels in the data center
- Interdependency of cabling architecture and thermal management
- Airflow optimization best practices
- Thermal management optimization technologies
- Improved operation and energy reduction from applied techniques

Upon completion of this course, the students will have an understanding of the ways in which the application of standards and best practices can help solve thermal issues and ultimately aid in energy conservation within the data center. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

IP-Based Physical Security for the Data Center – Level 200 (BICSI CEC: 1)

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This course examines the need to provide for increased IP-based physical security for data centers and the various compliance mandates that dictate increased levels of physical security in the data center. The concept of crime prevention through environmental design (CPTED) and the framework of the rings or layers of physical security for the data center facility will be explained. This course will describe a number of the available technologies and their capabilities that mitigate the potential risk to the data center facility and its content while potentially reducing overall equipment and operational costs for providing increased physical security. The topics covered in this course include the following:

- Unique security challenges presented by data center facilities
- Business and technology trends in physical security systems
- Developing a physical security plan
- Layers of security for a data center facility
- Applicable standards and best practices for data center physical security

Upon completion of this course the students will have an understanding of the types of IP-based physical security systems that are available to meet the internal and external regulatory compliances that are pertinent to the operation of a data center. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

PHYSICAL SECURITY COLLEGE

Physical Security College is designed to help students understand the various types of solutions available for corporate physical security systems, including video surveillance and access control systems. The courses aid in the development of comprehensive systems for a variety of corporate environments and applications by using the most recent hardware and software technologies. The course content is divided into sections that go in-depth on designing security systems, the components of video surveillance and access control systems, the communication media required by the systems and the methods of powering the components of the system.

Who should attend?

The courses in Physical Security College are relevant to the design and operational concerns of end-user or owner/operator organizations as well as physical security integration and installation organizations. It is most beneficial to organizations if representatives of each discipline who have responsibilities that touch the physical security system complete all of the sessions that are available. These groups would typically include facilities, corporate security as well as the information systems and network groups to understand the interdependent nature of virtually all decisions that are made in regard to the design and operation of the modern physical security system. With the historical responsibility for the physical security of a facility or campus residing within the facilities or campus security departments of an organization, it is now necessary for those groups and the information services and networking groups to mutually understand the needs, benefits and advantages of new physical security systems. The new technologies, which are based on IP/Ethernet open systems environments and transport, are vastly different and more powerful for the organization than the previously closed system analog based technologies.

COURSE DESCRIPTIONS

Physical Security Systems: Fundamentals of Design – Level 100 (BICSI CEC: 1)

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This is the foundation course of Physical Security College. It examines the design of a comprehensive physical security system for an organization from a high level. The course material is based upon accepted standardized industry approaches to designing physical security systems for any size organization. This course examines the following topics:

- Standards, regulations and guidelines for physical security system design
- The design process and determining the objectives of the physical security system
- Determining the goals and designing the physical security system
- Analysis of the physical security system design
- System design and relation to risk

Upon completion of this course, students will have an understanding of the process of designing a comprehensive physical security system and will be prepared to begin the design discussions within their organization. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Understanding the Components of an Access Control System – Level 100 (BICSI CEC: 1)

Duration: 75 minutes – On Demand for Individuals or Skype Webcast for Groups

This course is a comprehensive discussion of the technologies, components and topologies of an access control system including the applicable codes and standards. This course examines the following topics:

- Theory and principles of access control
- Physical, mechanical and electronic access control
- Access control credentials
- System accessories
- Communications infrastructure and open systems interoperability

Upon completion of this course, students will have knowledge of the major components of various types of access control systems, their relationship to one another and the influence of the applicable codes and standards on the system design. The students will be able to apply the design criteria learned in the Fundamentals of Design course to the design of an access control system. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Understanding the Components of Video Surveillance System – Level 100 (BICSI CEC: 1)

Duration: 70 minutes – On Demand for Individuals or Skype Webcast for Groups

This course is a comprehensive discussion of the technologies, components and topologies of a video surveillance system. The course looks at the system from the headend to the cameras at the edge of the system and explores the differences between analog and network video systems. This course examines the following topics:

- Theory of visual security including analog and network video systems
- Video surveillance system components and technologies
- Topologies and cabling infrastructures
- Network video systems
- IP network considerations

Upon completion of this course, students will have knowledge of the major components of analog and network video surveillance systems. The students will be equipped to have informed discussions with organization IT personnel on the implementation of a network video system and will be able to apply the design criteria learned in the Fundamentals of Design course to the design of a video surveillance system. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

IP-Based Physical Security for the Data Center – Level 200 (BICSI CEC: 1)

Duration: 60 minutes – On Demand for Individuals or Skype Webcast for Groups

This course examines the need to provide for increased IP-based physical security for data centers and the various compliance mandates that dictate increased levels of physical security in the data center. The concept of crime prevention through environmental design (CPTED) and the framework of the rings or layers of physical security for the data center facility will be explained. This course will describe a number of the available technologies and their capabilities that mitigate the potential risk to the data center facility and its content while potentially reducing overall equipment and operational costs for providing increased physical security. The topics covered in this course include the following:

- Unique security challenges presented by data center facilities
- Business and technology trends in physical security systems
- Developing a physical security plan
- Layers of security for a data center facility
- Applicable standards and best practices for data center physical security

Upon completion of this course, the student will have an understanding of the types of IP-based physical security systems that are available to meet the internal and external regulatory compliances that are pertinent to the operation of a data center. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

BUILDING TECHNOLOGIES COLLEGE

Building Technologies College is designed to help an organization understand the various types of building technology solutions to consider when planning to renovate or build a new corporate facility or campus. These courses aid in the development of comprehensive systems for a variety of corporate environments and applications using the most recent hardware and software technologies. The course content will be divided into sections that go into depth on subjects such as Professional Audio-Visual systems, Distributed Antenna Systems (DAS - indoor extension of RF, cell and Wi-Fi coverage), copper and fiber cabling for IP/Ethernet data communications networks, passive optical LAN (POL), intelligent building management systems and unified communications systems.

Who Should Attend

The courses in the Building Technologies College are relevant to the design and operational concerns of end-user or owner/operator organizations as well as integration and installation organizations involved with one or more of the building technologies covered. It is most beneficial to organizations if representatives of each discipline who have responsibilities that touch the building technologies systems complete all of the relevant course for the desired discipline. These operational groups would typically include facilities as well as the information systems and network groups to understand the interdependent nature of virtually all decisions that are made in regard to the design and operation of the modern building technologies systems. The new technologies—which are based on IP/Ethernet open systems environments and use transport media such as copper twisted pair, fiber optic and radio frequency (RF)—must be adequately designed and provisioned in order to allow the systems to operate effectively, efficiently and reliably. These are the components that comprise the “pavement of the Information Highway” and as such their design, specification and installation must meet the performance expectations of the organization and the end-users.

COURSE DESCRIPTIONS

Introduction to Professional Audio/Visual Systems – Level 100

(BICSI CEC: 1; INFOCOMM RUs: CTS – 1.5, CTS-D – 1.5)

Duration: 90 minutes – On Demand for Individuals or Skype Webcast for Groups

This course examines the component and design considerations for professional audio/visual systems in a commercial building environment. The course introduces current and emerging standards within the audio/visual industry. The following topics are covered in the course:

- Professional A/V system and industry definition
- Current and emerging A/V industry standards
- User environment design considerations
- A/V systems, subsystems and components
- Professional A/V system applications

Upon completion of this course, students will have a basic understanding of the considerations necessary in the design of a professional A/V system and will be prepared to begin the design discussions within their organization. This course requires the successful completion of a knowledge assessment, after which a completion certificate eligible for CEC transcript submission will be issued to the student.

Understanding the BICSI DAS Standard (ANSI/BICSI 006-2015) – Level 100

Duration: 60 Minutes – Skype Webcast for Groups

This course examines the content of the BICSI standard for Distributed Antenna System Design and Implementation Best Practices. The course looks at the purpose, scope and codes related to DAS systems. It also outlines the major components of a system and their design and implementation. The following topics are covered in the course:

- Purpose, Scope and Codes
- Systems and Components
- Headend and Backend equipment
- Cabling and antennas
- DAS Design and implementation

Upon completion of this course, students will have a basic understanding of the subject areas covered by the BICSI standard and will have the general knowledge necessary to understand the necessary components of a distributed antenna system, its design and implementation.

Wireless Fundamentals and Best Practices – Level 100

Duration: 15 minutes: On-demand for individuals or Skype webcast for groups

This course focuses on building a baseline knowledge of IEEE 802.11 wireless networking by gaining an understanding of wireless fundamentals and best practices. This course examines the following topics:

- Radio frequency properties
- Types of interference
- PHY rate & throughput
- Characteristics of the IEEE 802.11 standard
- Wireless best practices

Upon completion of this course, students will have an understanding of the various characteristics of the IEEE 802.11 standard for wireless networking, a baseline knowledge of wireless architectures and a comprehension of the differences between the various wireless frequencies. The students will be able to apply the design criteria learned in the Wireless Fundamentals and Best Practices to the conceptual design of an IEEE 802.11 wireless networking system.

INDUSTRIAL INFRASTRUCTURE COLLEGE

Industrial Infrastructure College is designed to help an organization understand the various types of industrial infrastructure technology solutions to consider when planning to renovate or build a new industrial facility or campus. These courses aid in the development of comprehensive systems for a variety of industrial communications environments and applications using the most recent hardware and software technologies. The course content covers the basic principles of Ethernet and IP networking with a focus on the manner in which the new control protocols are best deployed in the industrial environments and applications

Who Should Attend

The courses in the Industrial Infrastructure College are relevant to the design and operational concerns of end-user or owner/operator organization. It is most beneficial to organizations if representatives of each discipline who have responsibilities that touch the industrial communications and control networks complete all of the relevant course for the desired discipline. These operational groups would typically include facilities, plant floor engineering and management as well as the information systems and network groups to understand the interdependent nature of virtually all decisions that are made in regard to the design and operation of the industrial communications and control technologies systems. The new technologies—which are based on IP/Ethernet open systems environments and use transport media such as copper twisted pair, fiber optic and radio frequency (RF)—must be adequately designed and provisioned in order to allow the systems to operate effectively, efficiently and reliably. These are the components that comprise the “pavement of the Information Highway” and as such their design, specification and installation must meet the performance expectations of the organization and the end-users.

COURSE DESCRIPTIONS

Industrial Network Ethernet – Level 100 (4 BICSI CECs)
Duration: 4 hours – Skype Webcast for Groups
As networking continues to advance and become more of an integral part of manufacturing and automation systems, understanding how this technology and its benefits are essential to plant automation and optimization are key. This course will give the student a basic understanding of networking and how it works and features that are beneficial to the industrial processes. As Ethernet migrates more into the everyday lives of industrial organizations, especially in the plant and factory floor environments, industrial networking and how to best deploy this technology will enable more efficient data communications and systems productivity.

Topics Include:

- *Ethernet Standards*
- *Cabling best practices*
- *OSI model and layers*
- *Switch verse Router*
- *Basics of IP addressing*
- *Unicast / Multicast traffic*

Upon completion of this course, students will have a comprehensive understanding of network and Ethernet development and the standards which govern their operation; the transport media used; MAC and IP addressing schemes; they types of data traffic and the electronics required for industrial Ethernet operation.

Industrial Network Ethernet – Level 200 (7 BICSI CECs)
Duration: 7 hours – Skype Webcast for Groups
Networking continues to become ever more present on the factory floor and industrial automation applications continue to evolve and broaden in scope and sophistication. Ethernet is the preferred means of communications when connecting devices, sensors, machines, and people. Speed, accuracy and reliability are of great importance when Ethernet technologies are used in industrial applications. This course will help the students understand more advanced networking technologies and how these technologies affect network traffic and management to improve the performance and reliability of network communications. The recommended prerequisite for this course is Industrial Network Ethernet Level 100 or significant understanding of the basic configuration and operation of an Industrial Ethernet network.

Topics Include:

- *IP addressing and subnetting*
- *Advanced switch options*
- *Redundancy and spanning tree*
- *VLAN configuration and uses*
- *Routers and Layer3 basics*
- *Basic security and firewall*
- *Network management*

Upon completion of this course, students will have gained in depth knowledge of the general configuration guidelines for Industrial Ethernet switches, routers and network security and management..

Anixter Inc. World Headquarters
2301 Patriot Boulevard
Glenview, Illinois 60026
224.521.8000