



# Academic Catalog

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## Table of Contents

<b>MISSION AND OBJECTIVES</b>	<b>4</b>
<b>HISTORY</b>	<b>5</b>
<b>INDUSTRY AFFILIATIONS</b>	<b>6</b>
TECHNIC AFFILIATIONS	6
EDUCATIONAL AFFILIATIONS	6
<b>SCHOOL OVERVIEW</b>	<b>7</b>
<b>GENERAL INFORMATION</b>	<b>8</b>
FACILITIES	8
CAMPUS INFORMATION	9
<b>ADMISSIONS REQUIREMENTS</b>	<b>10</b>
PROCEDURES	10
SCHEDULE OF TOTAL CHARGES	11
CLOCK HOUR CONVERSION	14
LANGUAGE	14
<b>TUITION AND REFUND POLICY</b>	<b>15</b>
INSTALLMENT CONTRACT	15
"STUDENT'S RIGHT TO CANCEL"	15
<i>Cancellation of Agreement</i>	15
<i>Withdrawal From Course</i>	15
<i>Hypothetical Refund Example</i>	16
DISCLOSURE	17
<b>ACADEMIC POLICIES</b>	<b>18</b>
SATISFACTORY ACADEMIC PROGRESS - DESCRIPTION	18
SATISFACTORY ACADEMIC PROGRESS – PROCESS FLOW	20
ATTENDANCE	21
TARDINESS	21
MAKE-UP WORKS	21
STUDENT CODE OF CONDUCTS	22
DISCIPLINARY DISMISSAL	22
CONDITIONS FOR RE-ENROLLMENT	22
GRADING SYSTEM	22
STUDENT'S RECORDS	23
COMPLAINT POLICIES AND PROCEDURE	23
STUDENT COMPLAINT PROCEDURE	23
GRADUATION REQUIREMENTS	24
<b>BRAND COLLEGE SERVICES</b>	<b>25</b>
STUDENT SERVICES	25
PLACEMENT SERVICES	26
INSTRUCTORS	26
<b>ACADEMIC PROGRAMS</b>	<b>27</b>
A+ (PC HARDWARE TECHNICIAN)	27
LINUX+ (LINUX CERTIFIED PROFESSIONAL)	30

MICROSOFT CERTIFIED SYSTEM ENGINEER (MCSE) -----	33
CISCO CERTIFIED NETWORK ASSOCIATE (CCNA) -----	49
CISCO CERTIFIED NETWORK PROFESSIONAL (CCNP ROUTING & SWITCHING)-----	52
CISCO CERTIFIED SECURITY PROFESSIONAL (CCSP) -----	57
CERTIFIED DESKTOP & NETWORK SPECIALIST (CDNS) -----	66
CERTIFIED LAN & WAN SPECIALIST (CLWS)-----	84
CISCO CERTIFIED NETWORK EXPERT (CCNE)-----	103
CERTIFIED NETWORK TECHNOLOGIES EXPERT (CNTE) -----	119
<b>2019 – 2020 ACADEMIC CALENDAR -----</b>	<b>141</b>

## **Mission and Objectives**

The primary mission of Brand College is to provide students with high quality, career oriented educational programs. Our goal is to ensure that students receive the highest possible standard of education in their field of study. At Brand College, we have made every effort to create the optimum environment in which students gain real-life experiences in the classroom. We aim to prepare our students to be fully capable to work "in the field". The education students receive at Brand College will greatly enhance their chances of securing the best possible employment in their field of study.

Students will benefit from our dedication to excellence in training, and our continuous efforts to provide the following:

- Personal, hands-on education.
- Ample class time, above and beyond the requirements, to ensure our students get a chance to absorb the material thoroughly, ask questions and practice through lab exercises.
- Small class sizes for individual attention.
- Instructors who have extensive real-life experience and a passion for training.

Now, more than ever, businesses have begun to demand industry certified employees who are qualified to plan, install, operate, maintain, and support today's complex computer environments. We believe that Microsoft and Cisco are the world's leading providers of system software/hardware for various businesses and demands are increasing for Microsoft and Cisco certified engineers with an emphasis on MCSE, CCNA, CCNP and CCSP.

As the computer market enters into a new era of automation, business needs are being re-evaluated to take advantage of the new technologies that are far more complex and sophisticated and require support personnel with advanced training and skills. With these changes, highly qualified individuals will be needed to allow organizations to improve their overall operations. With increased computerization and automation of the business environment, computer training has become a needed commodity in this ever-changing field. As technology rapidly advances, it is apparent that well-educated and highly trained personnel are in demand to manage and operate this growing computing platform.

The areas of need will range from training for basic software skills to highly technical training on how to develop and maintain computer systems for large and growing organizations and enterprises.

The above needs simply illustrate that there is a vast pool of candidates eligible for Brand College's programs. Candidates will range from individuals just starting in the field of technology to those experienced and technical personnel wanting to upgrade or update their skills.

## History

Brand College was established in 2004 in Glendale, California, as a Limited Liability Corporation.

Brand College, a private institution, approved to operate by California Bureau for Private Postsecondary Education. Approval to operate means the institution is compliant with minimum standards contained in California Private Postsecondary Education Act of 2009 (as amended) and Division 7.5 of Title 5 of California Code of Regulations.

Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution maybe directed to the Bureau for Private Postsecondary education at:

2535 Capitol Oaks Drive, Suite 400  
Sacramento, CA 95833

P.O. Box 980818  
West Sacramento, CA 95798-0818

[www.bppe.ca.gov](http://www.bppe.ca.gov)

Toll free telephone number (888) 370-7589  
or by fax (916) 263-1897

The primary focus of the organization is to provide quality training to its clients in the area of Information Technology and related studies. The organization currently has five (5) partners and will be operating out of its headquarters in Glendale, California. The company offers its customers a unique combination of expertise – comprehensive and practical Information Technology training in many of the sought-after programs in the industry.

The primary mission of the organization is to provide students with high quality, career oriented programs. Our goal is to ensure that students receive the highest possible standard of education in their field of study. At Brand College, we have made every effort to create the optimum environment in which students gain real-life experiences in the classroom. We aim to prepare our students to be fully capable to work “in the field”. The education students receive at Brand College will greatly enhance their chances of securing the best possible employment in their field of study.

Our educational services include:

1. Certification training programs including:
  - a. Microsoft Certified System Engineer (MCSE),
  - b. Cisco Certified Network Associate (CCNA),
  - c. Cisco Certified Network Professional (CCNP)
  - d. and Cisco Certified Security Professional (CCSP);
2. Comprehensive programs including:
  - a. Certified Desktop & Network Specialist (CDNS),
  - b. Certified LAN & WAN Specialist (CLWS),
  - c. Cisco Certified Network Expert (CCNE),
  - d. and Certified Network Technologies Expert (CNTE);
3. Skill and knowledge enhancement training not specifically linked to certifications including:
  - a. Security training for firewall and VPN solutions,
  - b. End-user and corporate training directed at updating employee/user skill set and knowledge base,
  - c. Certification preparation,
  - d. and certification testing.

## **Industry Affiliations**

Brand College is proud to honor affiliations with industry and educational leaders while it continues to expand its partnerships, certifications, and/or memberships:

### **Technic Affiliations**

- VMWare IT Academy
- Palo Alto IT Academy

### **Educational Affiliations**

- Brand College is accredited by the Accrediting Commission of Career Schools and Colleges (ACCSC)
- Brand College is licensed to operate by BPPE. For more information visit [www.bppe.ca.gov](http://www.bppe.ca.gov)
- Brand College is approved for the training of veterans and eligible persons under the provisions of title 38, United States code
- Pearson VUE Testing Center
- CAPPS (The California Association of Private Postsecondary Schools)
- Dun and Bradstreet

## **School Overview**

We believe a key element to the future success of Brand College will be the quality of its personnel. The team of individuals that is to become Brand College is comprised of a balanced blend of engineers, instructors, business managers, and administrators. Each member of the organization brings a high level of expertise and experience to the team. Additionally, the group has already attracted a number of highly regarded outside contractors and professional support personnel. Brand College is a cohesive group of talented, energetic, individuals fully prepared to build a highly successful, well regarded, IT company.

Brand College has no pending petition in bankruptcy, is not operating as a debtor in possession, has not filed a petition within the preceding five years, or has not had a petition in bankruptcy filed against it within the preceding five years that resulted in reorganization under Chapter 11 of the United States Bankruptcy Code (11 U.S.C. Sec. 1101 et seq.).

## **General Information**

### **Facilities**

Brand College is located in Glendale, California at 529 Hahn Avenue, near the heart of the Glendale business district. The facilities can be found on the first floor of a two-story building. The space occupied by school is approximately 1,340 square feet.

The space consists of two classrooms/labs, a student lounge area, administrative offices, Pearson VUE Testing Center, and a library/resource center.

The classrooms/lab 1 accommodates up to 16 students while the classroom/lab 2 can accommodate up to 12 students. Both classroom/labs provide a student to computer ratio of 1:1, equipped with up-to-date computer equipment.

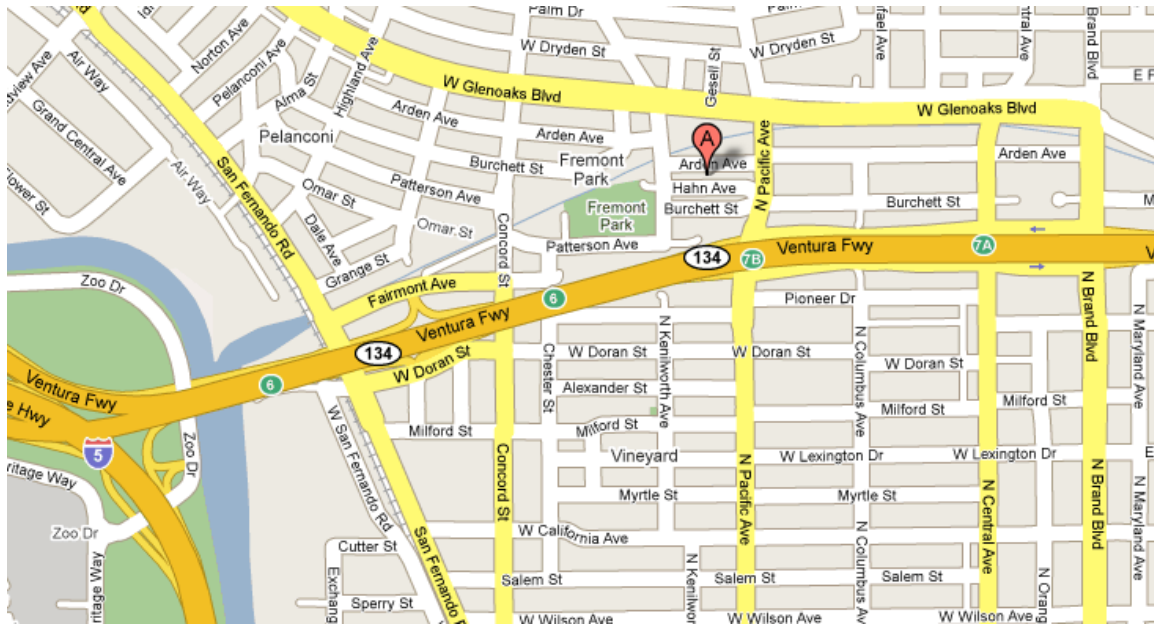
School's labs are equipped with hardware, software and network infrastructure as required by training programs.

All areas of the facility are well lighted and well ventilated. Additionally, the west side of the building is banked by large windows allowing for pleasant, natural lighting into a significant portion of the suites.



## Campus Information

The school is open from 8:00am to 10:00pm, Monday through Thursday, 8:00am to 5:00pm on Friday, Saturday and Sunday, excluding holidays.



## **Admissions Requirements**

To be admitted to any program at Brand College, applicants must provide one of the following documents, prior to start of the program.

1. Copy or original high school transcript indicating the applicant fulfilled the requirements for graduation from high school.
2. Copy or original recognized equivalency certificate such as the General Education Development (GED) or copy or original GED transcript showing fulfillment of the requirements for a GED.
3. Copy or original applicant's high school diploma, associate degree, bachelor's degree or master's degree.
4. Copy or original of postsecondary school academic transcript which gives proof to one of the following: completed associate, bachelor or master's degree.
5. All applicants from foreign, non-English speaking countries must provide above documentation that is to be translated and certified to be at least equivalent to a U.S. high school diploma. The agency should be a member of the National Association of Credential Evaluation Services (NACES) or Association of International Credential Evaluators (AICE).
6. All applicants must pass an entrance exam given by the college before the start of class.

Brand College's programs entail rigorous computer-based training requiring basic computer knowledge, logic and reasoning abilities, mathematics aptitude, and writing skills. In order to accurately evaluate an applicant's ability to succeed in this training program, prospective students have to successfully pass school's entrance exam. The Wonderlic is a designated exam for Brand College. Score of at least 12 will be required for an applicant to be considered for admission to school. The exam may not be repeated within a seven-day period in the event the applicant does not pass the exam.

As a prospective student, you are encouraged to review this catalog prior to signing an enrollment agreement. You are also encouraged to review the School Performance Fact Sheet, which must be provided to you prior to signing an enrollment agreement.

Brand College encourages students to review the catalog and School Performance Fact Sheet prior to signing the school's enrollment agreement.

## **Procedures**

To apply for admissions, applicants should contact the admissions department to schedule an interview with one of our Admissions Representatives. The applicant will have an extensive interview with school's admissions personnel. In this session panel members will discuss the applicant's background, interest and future plans in the area of interest, and tour the facility. Current job market analysis will be included in determining the needs of the student in his/her specific field of study. If there is an interest in the school, an entrance exam will be administered.

Applicants should be prepared to present a copy of their diploma or GED along with the required registration fee.

Upon acceptance into the school, the applicant will complete an enrollment agreement that outlines applicant's financial responsibility.

If the school rejects the applicant, he/she will be notified immediately and all sums paid as part of the program tuition will be fully refunded to the student.

## Schedule of Total Charges

Program	Tuition, Books, and Equipment
Cisco Certified Network Associate	\$2,500.00
Cisco Certified Network Professional	\$7,500.00
Cisco Certified Security Professional	\$10,000.00
Certified Network Technologies Expert	\$31,000.00
Microsoft Certified System Engineer	\$7,500.00
Certified Desktop & Network Specialist (CDNS)	\$9,000.00
Certified LAN & WAN Specialist (CLWS)	\$10,000.00
Cisco Certified Network Expert (CCNE)	\$20,000.00

*The school reserves the right to adjust tuition rates. In no event will any such changes affect the students that already have signed an enrollment agreement with the school.*

1. The charges for period of attendance and the total charges for the entire program are the same
2. Total charges for each program include textbooks, equipment, and or any material needed.

## 76215. Student Tuition Recovery Fund Disclosures

(a) A qualifying institution shall include the following statement on both its enrollment agreement and school catalog:

"The State of California established the Student Tuition Recovery Fund (STRF) to relieve or mitigate economic loss suffered by a student in an educational program at a qualifying institution, who is or was a California resident while enrolled, or was enrolled in a residency program, if the student enrolled in the institution, prepaid tuition, and suffered an economic loss. Unless relieved of the obligation to do so, you must pay the state-imposed assessment for the STRF, or it must be paid on your behalf, if you are a student in an educational program, who is a California resident, or are enrolled in a residency program, and prepay all or part of your tuition.

You are not eligible for protection from the STRF and you are not required to pay the STRF assessment, if you are not a California resident, or are not enrolled in a residency program."

(b) In addition to the statement required under subdivision (a) of this section, a qualifying institution shall include the following statement in its school catalog:

"It is important that you keep copies of your enrollment agreement, financial aid documents, receipts, or any other information that documents the amount paid to the school. Questions regarding the STRF may be directed to the Bureau for Private Postsecondary Education, 2535 Capitol Oaks Drive, Suite 400, Sacramento, CA 95833, (916) 431-6959 or (888) 370-7589.

To be eligible for STRF, you must be a California resident or are enrolled in a residency program, prepaid tuition, paid or deemed to have paid the STRF assessment, and suffered an economic loss as a result of any of the following:

1. The institution, a location of the institution, or an educational program offered by the institution was closed or discontinued, and you did not choose to participate in a teach-out plan approved by the Bureau or did not complete a chosen teach-out plan approved by the Bureau.
2. You were enrolled at an institution or a location of the institution within the 120 day period before the closure of the institution or location of the institution, or were enrolled in an educational program within the 120 day period before the program was discontinued.
3. You were enrolled at an institution or a location of the institution more than 120 days before the closure of the institution or location of the institution, in an educational program offered by the institution as to which the Bureau determined there was a significant decline in the quality or value of the program more than 120 days before closure.
4. The institution has been ordered to pay a refund by the Bureau but has failed to do so.
5. The institution has failed to pay or reimburse loan proceeds under a federal student loan program as required by law, or has failed to pay or reimburse proceeds received by the institution in excess of tuition and other costs.
6. You have been awarded restitution, a refund, or other monetary award by an arbitrator or court, based on a violation of this chapter by an institution or representative of an institution, but have been unable to collect the award from the institution.
7. You sought legal counsel that resulted in the cancellation of one or more of your student loans and have an invoice for services rendered and evidence of the cancellation of the student loan or loans.

To qualify for STRF reimbursement, the application must be received within four (4) years from the date of the action or event that made the student eligible for recovery from STRF.

A student whose loan is revived by a loan holder or debt collector after a period of noncollection may, at any time, file a written application for recovery from STRF for the debt that would have otherwise been eligible for recovery. If it has been more than four (4) years since the action or event that made the

student eligible, the student must have filed a written application for recovery within the original four (4) year period, unless the period has been extended by another act of law.

However, no claim can be paid to any student without a social security number or a taxpayer identification number."

**Clock Hour Conversion**

- Term- Quarter (12 weeks)
- Classroom/Laboratory Contact Hour – Fifty (50) minutes of class time
- One Quarter Credit Hour - Twelve (12) hours of classroom contact plus appropriate outside preparation
- One Quarter Clock Hour - Twenty-four (24) hours of supervised laboratory instruction plus appropriate outside preparation

**Language**

Brand College only offers classes in English. We do not offer ESL classes.

## Tuition and Refund Policy

### Installment Contract

Installment of more than four (4) payments requires the completion and execution of Brand College's Promissory Note – Tuition Assistance agreement in addition to this Enrollment Agreement. Student (and Co-buyer, if applicable) understands that payments are made to the School (Brand College). Payments 10 days delinquent may accrue a LATE CHARGE of the lesser of 5%, \$5 or maximum allowed by law. If account is delinquent for over 90 days, the entire amount may become due and payable. I/we Student (and Co-buyer, if applicable), agree to pay all funds owed under this agreement to the school on demand. I/we Student (and Co-buyer, if applicable), do not, I/we agree to pay all costs of collection, including attorney and collection agency costs in addition to what I/we owe. The Agreement is not binding until accepted by the School. Student may pay off balance in advance (within 90 days of start date) and receive partial refund of interest computed by the actuarial method. **NOTICE: Any holder of this consumer credit contract is subject to all claims and defenses which debtor (student) could assert against seller (school) services obtained hereunder. Recovery hereunder by the debtor (student) shall not exceed the amount paid by the debtor (student) hereunder.**

### “Student’s Right to Cancel”

#### Cancellation of Agreement

You have the right to cancel this agreement for a course of instruction including any equipment such as books or any other goods related to the instruction offered in this agreement, through attendance at the first class session or until midnight of the seventh (7) business day after enrollment, whichever is later. Student has the right to obtain a refund of charges paid through attendance at the first class session, or the seventh day after enrollment, whichever is later.

Cancellation shall occur when you give written notice of cancellation at the address of the School shown on the top of the front and back page of this agreement. You can do this by mail, hand delivery, or telegram. The written notice of cancellation, if sent by mail, is effective when deposited in the mail properly addressed with postage prepaid. The written notice of cancellation need not take any particular form and, however expressed, it is effective if it shows that you no longer wish to be bound by agreement. You will be given two Notice of Cancellation forms to use at the first day of class, but you can use any written notice that you wish.

If the school has given you any equipment, including books or other materials, you shall return it to the school within 30 days following the date of your notice of cancellation. If you fail to return this equipment, including books, or other materials, in good condition within a 30-day period, the school may deduct its documented cost for the equipment from any refund that may be due to you. Once you pay for the equipment, it is yours to keep without further obligation. If you cancel this agreement, the school will refund any money that you paid, less any deduction for equipment not timely returned in good condition, within 30 days after your notice of cancellation is received.

#### Withdrawal From Course

You have the right to withdraw from a course of instruction at any time. If you withdraw from the course of instruction after the period allowed for cancellation of the agreement, which is until midnight of the seventh (7) business day following the first class you attended, the school will remit a refund less a registration fee, if applicable, not to exceed \$75.00 within 30 days following your withdrawal. You are obligated to pay only for education services rendered and for unreturned equipment. The refund shall be the amount you paid for instruction, less a registration fee, multiplied by a fraction in which the numerator is the number of hours of instruction which you have not received but for which you have paid, and the denominator is the total number of hours of instruction for which you have paid. If you

obtain equipment, as specified in the agreement as a separate charge, and return it in good condition within 30 days following the date of your withdrawal, the school shall refund the charge for equipment paid by you. If you fail to return the equipment in good condition, allowing for reasonable wear and tear, within 30 days period, the school may offset against the refund the documented cost to the school of that equipment. You shall be liable for the amount, if any, by which the documented cost for equipment exceeds the prorated refund amount. The documented cost of the equipment may be less than the amount charged, and the amount the school has charged in the contract.

In any event, you will never be charged for more than the equipment charges stated in the contract. For a list of these charges, see the list on the front of this page. IF THE AMOUNT THAT YOU HAVE PAID IS MORE THAN THE AMOUNT THAT YOU OWE FOR THE TIME YOU ATTENDED, THEN REFUND WILL BE MADE WITHIN 30 DAYS OF WITHDRAWAL. IF THE AMOUNT THAT YOU OWE IS MORE THAN THE AMOUNT THAT YOU HAVE ALREADY PAID, THEN YOU WILL HAVE TO MAKE ARRANGEMENTS TO PAY IT.

An approved leave of absence (LOA) is not considered to be a withdrawal of the student which requires a refund. A LOA is approved if, (1) the student has made a written request for the LOA, (2) the leave of absence does not exceed sixty (60) days, (3) the school has granted only one LOA to the student in any 12-month period, and (4) the school does not charge the student for the LOA. If the LOA is not approved then the student is considered withdrawn from the school, and the refund requirements apply.

#### **Hypothetical Refund Example**

Assume the student has paid in full the following charges for a 400-hour course:

Registration Fee:	\$75.00
Tuition:	\$2,025.00
Equipment:	\$150.00

(student has received all necessary equipment)

Student withdraws from the school after 100 hours of instruction. The pro rata refund for the student would be:

$$(2025 \times 300) / 400 = 1518.75 \text{ (refund of \$1,518.75)}$$

If the student returns the equipment in good condition within 10 days following his/her withdrawal, the school shall refund the charge for the equipment paid by the student. Thus the refund amount will be:

$$\$1,518.75 + \$150 = \$1,668.75$$

For the purpose of determining the amount you owe for the time you attended, you shall be deemed to have withdrawn from the course when any of the following occurs:

- (a) You notify the school of your withdrawal or the actual date of withdrawal.
- (b) The school terminates your enrollment. \*\*
- (c) You fail to attend classes for a three-week period. In this case, the date of withdrawal shall be the last date of recorded attendance.
- (d) You fail to submit three consecutive lessons or you fail to submit a completed lesson required for home study or correspondence within 60 days of its due date.

If a student obtains a loan to pay for an educational program, the student will have the responsibility to repay the full amount of the loan plus interest, less the amount of any refund, and that, if the student has received federal student financial aid funds, the student is entitled to a refund of the moneys not paid from federal student financial aid program funds.



***\*\*Grounds for cancellation/termination by the school – failure to maintain satisfactory academic progress, excessive unexcused absences, violation of school Codes of Conduct, and/or failure to meet financial obligations to the school.***

## **Disclosure**

The school reserved the right to cancel a class start date due to insufficient enrollment. If this occurs, the student may request a full refund of all monies paid or apply all monies paid to the next scheduled class start date. The school reserves the right to change or modify the program contents, equipment, staff or materials as it deems necessary. Such changes may be necessary to keep pace with technological advances and to improve teaching methods or procedures. In no event will any such changes diminish the competency or content of any program or result in additional charges to the student.

While the school offers Placement Assistance, the school cannot, in any way, guarantee employment after the student has successfully completed the program of study.

**NOTICE CONCERNING TRANSFERABILITY OF CREDITS AND CREDENTIALS EARNED AT OUR INSTITUTION:** The transferability of credits you earn at Brand College is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the certificate you earn in the educational program is also at the complete discretion of the institution to which you may seek to transfer. If the certificates that you earn at this institution are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending Brand College to determine if your certificate will transfer.

You must pay the state imposed assessment for the Student Tuition Recovery Fund (STRF) if all of the following applies to you: 1. You are a student in an educational program, who is a California resident, or are enrolled in a residency program, and prepay all of part of your tuition either by cash, guaranteed student loans, or personal loans, and 2. Your total charges are not paid by any third-party payer such as an employer, government program or other payer unless you have a separate agreement to repay the third party. You are not eligible for protection from the STRF and you are not required to pay the STRF assessment if either of the following applies: 1. You are not a California resident, or are not enrolled in a residency program, or 2. Your total charges are paid by a third party, such as an employer, government program or other payer, and you have no separate agreement to repay the third party.

## Academic Policies

### Satisfactory Academic Progress - Description

The following is a description of the school's process and activities supporting a consistent SAP analysis and reporting on regular intervals.

1. Director of Education and the School Director meet during the Administrative Week following the conclusion of each school term.
2. The student transcripts are then sent to students via postal mail and email.
3. Students who do not meet the required and satisfactory academic progress are placed on Probation I for one term.
4. Students who are on probation will be counseled by the school and a plan will be set to help the student to return to satisfactory standing with their academic progress. Students who are on probation are also on a limited enrollment plan. Full-time students can enroll for a maximum of 6 units while part-time students cannot take more than 3 units under this probationary period.

Example of Satisfactory Academic Progress requirements (CCNP Program):

Program Interval	Satisfactory Completion	Minimum GPA
Module 1	25% or higher	1.0
Module 2	50% or higher	1.5
By completion of program	100%	2.0

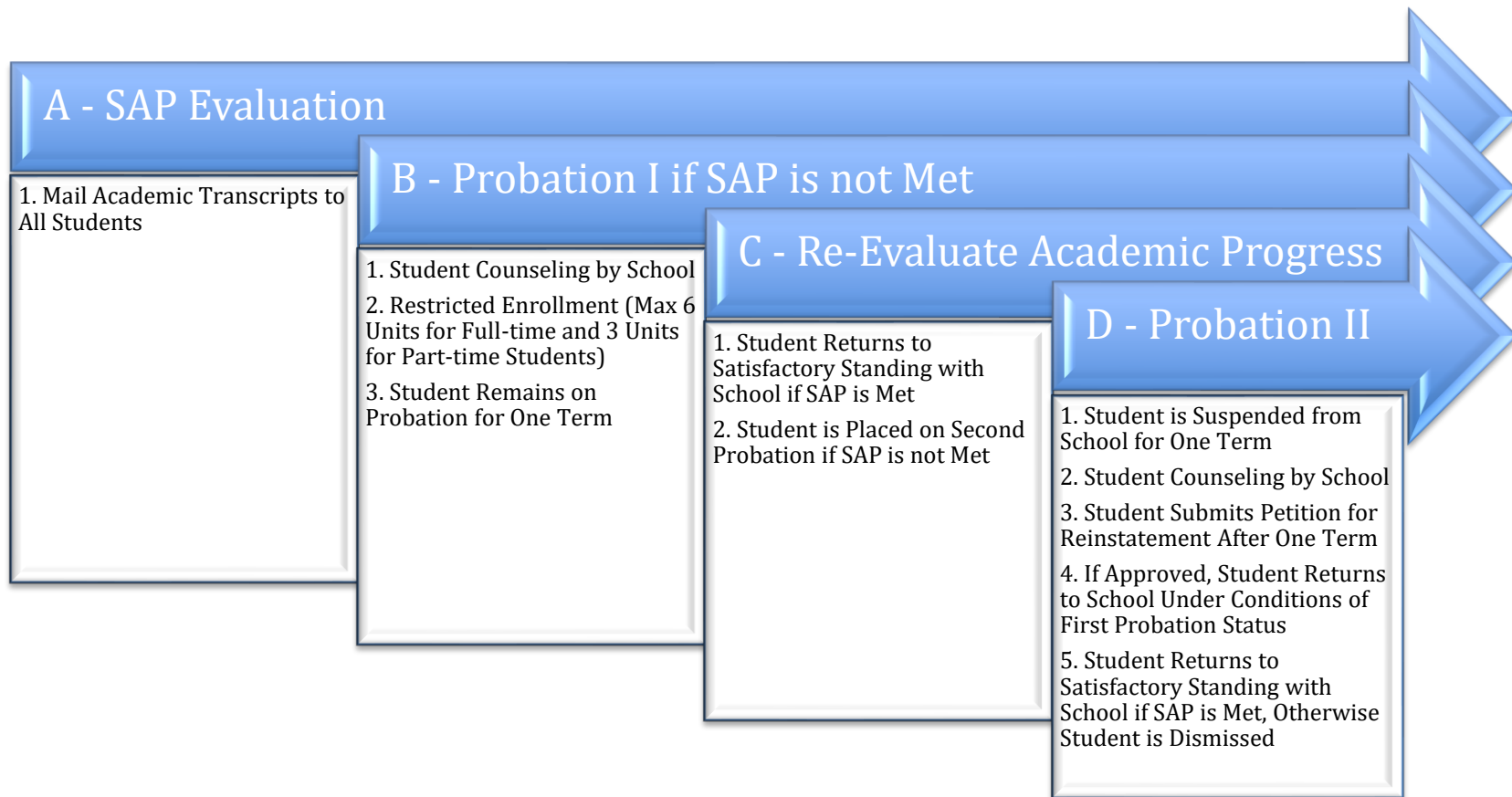
5. If by the end of the first term in the probationary period the student meets the required and satisfactory academic progress, the student's status is then restored to satisfactory academic standing with the school.
6. In the event the student still does not meet the satisfactory academic progress at the end of the first probationary period, the student is then placed on Probation II and is suspended from the school for one term. While suspended, the student will go through counseling with the school in order to set a plan and return to satisfactory standing with the school.
7. At the end of the suspension period, the student has the option to submit a Petition for Reinstatement on Probationary Status form to provide information that may be deemed justifiable for the student's academic difficulties.
8. The school will review the information provided by the student and will determine if the student should be allowed to return to school based on the information provided by the student and verified by the school.
9. Should the school approve the student's return, the student will resume school under the status of Probation I as described above.
10. Upon the completion of the term, if the student meets the required and satisfactory academic progress, the student's status is then restored to satisfactory academic standing with the school.

The student is dismissed from the school otherwise. After six months, the student has the option to submit a petition for reinstatement.

The maximum time limit for a student to complete a program is 1.5 times the program length in weeks. If students do not complete the training within the maximum time frame they will be dropped from the program.

<b>Program Name</b>	<b>Quarter (Clock Hrs)</b>	<b>Length (in weeks)</b>	<b>Max Time (in weeks)</b>
Microsoft Certified System Engineer (MCSE)	480	60	90
Cisco Certified Network Associate (CCNA)	96	12	18
Cisco Certified Network Professional (CCNP)	192	24	36
Cisco Certified Security Professional (CCSP)	288	36	54
Certified Desktop & Network Specialist (CDNS)	624	78	117
Certified LAN & WAN Specialist (CLWS)	624	78	117
Cisco Certified Network Expert (CCNE)	624	78	117
Certified Network Technologies Expert (CNTE)	1152	48	72

## Satisfactory Academic Progress – Process Flow



**Attendance**

A student in any class will be placed on attendance probation if she/he accumulates three consecutive or four cumulative unexcused absences. While on attendance probation, the student will be dismissed with an additional unexcused absence.

**Tardiness**

A student who is more than 15 minutes late to class, or who leave class more than one half hour early on four occasions will accrue one day of absence.

**Make-Up Works**

Students are required to make-up all assignments, exams, or other missed work as a result of an excused or unexcused absence. Arrangements to make up a missed exam must be made with the instructor.

## Student Code of Conducts

To maintain an environment of social, moral and intellectual excellence, the college expects each student to behave in a mature and professional manner.

In essence, students need to display the following:

- Conduct that is orderly at all times
- Honesty & professionalism
- Respect for college and/or other student's property
- Professional attire

## Disciplinary Dismissal

Any student who violates the following is liable for dismissal from her/his program:

- Student codes of conduct
- Cheating
- Drug/alcohol abuse
- Failure to meet financial obligations
- Failure to maintain satisfactory academic progress (SAP)
- Failure to comply with the School's policies (attendance, tardiness, etc.)

However, any student who has been dismissed may appeal the action, in writing, to the Director. The appeal must contain supporting, verifiable documentation that the unacceptable performance was the result of mitigating circumstances.

## Conditions for Re-Enrollment

A student will be eligible for re-admissions if the director is satisfied with the evidence shown and the conditions that cause the interruption have been rectified.

## Grading System

Grades are issued within two weeks after the end of each term. Designators indicate academic action, not grades, and are not included when computing academic averages. Grades and designators are assigned as follows:

**Grade of F-Failing:** A student, who receives an F in a required course, must repeat the course and receive a passing grade. Upon completion of a repeated course with a passing grade, the new grade will replace the failing grade in CGPA computation.

Index Grade	Percentage Equivalent	Grade Point
A	90-100	4
B	80-89	3
C	70-79	2
D	60-69	1
F	Below 60	0
I	Incomplete	0

## Designators

P = Proficiency Test

T = Transfer Credit

W = Withdrawal

**Grade of I-Incomplete:** A grade of I signifies not all the required course work was completed during the term of enrollment. All required work must be completed by the end of the first week of the following term. If course requirements are not satisfied by the deadline, the grade I will be converted to an F.

**Designator W-Course withdrawal:** Designator W indicates that the student withdrew from a course prior to the withdrawal deadline. Students may withdraw from any program module from Monday of week 2 through Sunday of week 4 of the program. The student will receive a grade of “W” for any module the student drops. No adjustments will be made to tuition and fees for the quarter unless the student is withdrawing from all modules in the program. As soon as the student retakes and completes any dropped modules the new grade for the module will take effect in student’s GPA and units will be added to the total units earned by the student.

**Designator P-Proficiency test:** Students may request a proficiency examination provided they have not previously taken the same class at Brand College.

**Designator T-Transfer credit:** An applicant wishing to transfer credit from another school must request a credit evaluation and provide an official transcript and a catalog from the transferring institution (grade must be ‘C’ or better). The Director will review the application and if the classes are determined to be equivalent to Brand College’s curriculum, credits will be transferred. School credits are transferable only at the discretion of the receiving institution. Credits earned at Brand College may or may not transfer to other institutions.

Brand College does not offer Experiential learning credits.

**Articulation Agreement:** Brand College has not entered into an articulation or transfer agreement with any other college or university.

### **Student’s Records**

Brand College will be using specialized registrar software, which will organize the school’s student population alphabetically and by social security number. The aforementioned software program is designed to also maintain data regarding students' personal information, attendance records, academic records and grades. A hard copy of each student's academic and financial records will be kept in the school's administrative offices for 5 to 7 years. Academic and financial records will be kept separately for the purpose of monitoring.

Student academic files will contain the following items: student contract with school, personal data sheet, emergency medical form, entrance exam, and proof of most recent degree. (GED will be accepted in place of a high school diploma.

### **Complaint Policies and Procedure**

Any individual with a complaint or a concern with the school is encouraged to reach out to the school faculty or staff members. There is a complaint log sheet available at the school’s administrative desk. The complaint can be submitted either in writing or discussed verbally with the school faculty or staff. The recipient of the complaint shall report the complaint and any pertinent information to Debbie Ruiz (Academics) for further review and timely resolution. The complainant(s) will be kept informed as to the status of the complaint as well as the final resolution by the school.

### **Student Complaint Procedure**

Schools accredited by the Accrediting Commission of Career Schools and Colleges must have a procedure and operational plan for handling student complaints. If a student does not feel that the school has adequately addressed a complaint or concern, the student may consider contacting the Accrediting Commission. All complaints reviewed by the Commission must be in written form and should grant

permission for the Commission to forward a copy of the complaint to the school for a response. This can be accomplished by filing the ACCSC Complaint Form. The complainant(s) will be kept informed as to the status of the complaint as well as the final resolution by the Commission. Please direct all inquiries to:

**Accrediting Commission of Career Schools and Colleges (ACCSC)**  
2101 Wilson Boulevard, Suite 302  
Arlington, VA 22201  
(703) 247-4212  
[www.accsc.org](http://www.accsc.org)

A copy of the ACCSC Compliant Form is available at the school and may be obtained by contacting Debbie Ruiz, Director or online at [www.accsc.org](http://www.accsc.org).

In addition to filing a complaint with the Accrediting Commission of Career Schools and Colleges (ACCSC), students may contact the Bureau of Private Postsecondary Education (BPPE). A student or any member of the public may file a complaint about this institution with the Bureau for Private Postsecondary Education by calling (888) 370-7589 or by completing a complaint form, which can be obtained on the bureau's internet website [www.bppe.ca.gov](http://www.bppe.ca.gov).

**Bureau of Private Postsecondary Education**  
P.O. Box 980818  
West Sacramento, CA 95798  
Tel: (888) 370-7589 or (916) 574-7720  
Fax: (916) 263-1897  
[www.bppe.ca.gov](http://www.bppe.ca.gov)

### **Graduation Requirements**

A student must achieve a cumulative grade point average (CGPA) of at least 2.00 and satisfactorily complete all current curriculum requirements to graduate. Graduation will not be permitted if the best recorded grade of a required course is F, I or the designator W. Transfer credit and proficiency examination credit fulfill graduation requirements. A candidate who transferred to Brand College must complete at least 35 percent of the required credit hours at the school. Prior to receiving a certificate of completion, a student must satisfy all financial obligations to the school.



## **Brand College Services**

### **Student Services**

School will provide a number of vital services to students. Each student will be continually monitored and counseled as to the best course selection for his/her specific background and goals. These course goals will be re-evaluated each term, and altered if necessary. This will afford each student with a training program designed to fit his/her specific academic and personal needs. We believe that this flexibility will engender a higher rate of success for each student. Students who feel the need for extra work and instruction will be evaluated by an academic advisor and offered tutoring at no extra cost. School is dedicated to facilitating in the success of all students working to develop their computing skills and knowledge.

**Tutoring Assistance** - Tutoring program is open to all students, at no cost. The program provides assistance on an individual basis or a group study when this format may be more appropriate. A tutor provides the tutoring with proficiency in the subject matter of the particular academic area. Tutoring is on an appointment basis. Students who wish to participate in the program or who are interested in becoming a tutor should contact the School Director.

**Learning Resources** - The school library/resource center contains wide array of carefully selected resources to support the needs of the students, faculty and staff. The library/resource center has an extensive collection of books, magazines, journals, newspapers, and internet access to assist those pursuing our training programs and prepare those planning a career in the IT industry. The library/resource center is used to obtain in-depth information on the subject matter, prepare students for classroom discussions, and prepare students for the certification exams. Resources are assigned to provide students with access to course related material, including additional readings, review and lab answers, lab files, multimedia presentations, and course related web sites.

**Assessment Assistance** - Assessment tests are given to identify the student's skill level in English and Math. Test scores are evaluated and measured in reference to the prerequisites of pertaining training courses. The objective is to assist admissions representative in recommending the most appropriate courses to meet the students' skill level and educational goals.

**Academic Advising** - Academic advising provides students with information about the requirements for the programs offered at the school. Students can obtain an academic plan that will include admission and general education requirements, as well as courses to best prepare them for their program of study.

**Placement Assistance** - Placement assistance is free of charge and is provided for certified graduates. Certified graduates are referred to various companies and consulting firms in the network of schools contacts. The placement advisor will assist students in determining where their interests lie, where their strengths are and what work would provide a sense of fulfillment. Students will find assistance in investigating different career possibilities.

**Testing Services** - Brand College is authorized center for tests administrated by Pearson Vue. Students may take any Pearson Vue administrated exam in a professional and comfortable setting.

Brand College does not have dormitory facilities under its control. Brand College does not offer student housing services and assumes no responsibility to find or assist a student in finding housing. According to Zillow.com, rentals in Glendale CA are approximately \$1,400 month.

## Placement Services

Placement assistance provides career information and referrals for part time and full time employment, resume assistance, interview preparation, career planning, occupational information and academic counseling.

Organization's consulting wing has built a highly respected reputation in the computer industry, which will also greatly benefit students. School has established numerous contacts with various companies and consulting firms. This database of business contacts will be available to students, as well.

A staff member will be working (approximately 20 hours weekly) to develop and extend Brand College's relationship with various outlets. This staff member will also be working to place students on an as needed basis.

School will work diligently to establish a working relationship with the placement divisions of both Cisco Inc. and Microsoft Corporation - two industry giants. These affiliations will, undoubtedly, be very valuable resources for students involved in the network training programs.

While the school offers Placement Assistance, the school cannot, in any way; guarantee employment after the student has successfully completed the program of study.

### Instructors

Name	Qualifications
Andre Abed	MCP, MCSE, MCT, MCTS, MCITP
Edwardo Argueta	MCSE, CCNA, CCNP
Alfons Manouk	MCP, MCSE, CCNA, CCNP
Thomas Kim	MCSE, CCNA, CCNP, CCSP
Jong Cho	CCNA, CCNP, CCSP

<b>MCP</b>	Microsoft Certified Professional
<b>MCSE</b>	Microsoft Certified Systems Engineer
<b>MCT</b>	Microsoft Certified Trainer
<b>MCTS</b>	Microsoft Certified Technology Specialist
<b>MCITP</b>	Microsoft Certified IT Professional
<b>CCNA</b>	Cisco Certified Network Associate
<b>CCNP</b>	Cisco Certified Network Professional
<b>CCSP</b>	Cisco Certified Security Professional

# Academic Programs

## A+ (PC Hardware Technician)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed for the novice without prior computer experience. Students will be introduced to computer hardware concepts and learn to build a Personal Computer (PC) from the ground up. Software concepts will be delivered via training on the newest versions of Microsoft Windows. The primary goal of this course is to give students a basic understanding of every aspect of hardware and software relating to the PC. However, the final portion of this course will introduce the student to basic networking concepts and network implementation using Microsoft Windows operating systems – a must for any individual planning to enter the IT field.

- Certification program
- 96 Contact Hours, 6 Credit Hours, 12 Weeks

Course No.	Course Name	Quarter Credit Hours	Clock Hours
IPC100	PC I	6	96
	<b>Total</b>	<b>6</b>	<b>96</b>

### Prerequisites

There are no prerequisites required to attend this course.

### Type of Document Received Upon Graduation

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

### Certification Tests

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

### Career Development

Students who successfully complete this program will be prepared for entry to midlevel professional opportunities in the IT field with emphasis on client workstation or desktop hardware, software and operating system support. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Desktop Support Technician, PC Technician, Helpdesk Support, Computer Hardware Engineer or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1151 Computer User Support Specialist
- 17-2061 Computer Hardware Engineers

### Recommended Next Course

Candidates wishing to further their education are recommended to consider the Microsoft certifications in client/server technologies as the next step toward becoming a well rounded IT professional.

## A+ Program Details

### COURSE IPC100

Title: PC Hardware and Operating System

Exam: CompTIA Exams 220-801 and 220-802

#### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises is designed to introduce the students to computer hardware concepts and the skills required to build a Personal Computer (PC) from the ground up. In addition, students will learn software concepts with the newest versions of Microsoft Windows. The primary goal of this course is to give students a basic understanding of every aspect of hardware and software relating to the PC. However, the final portion of this course will introduce the student to basic networking concepts and network implementation using Microsoft Windows operating systems.

#### **Course Objectives**

This course will cover the following subjects:

- Skills in Managing and Troubleshooting PCs
- Operational Procedures
- Perform Preventive Maintenance
- Diagnostics and Troubleshooting
- Professionalism and Communication
- Safety and Tools
- Personal Computer Components
- System Unit Components
- Personal Computer Connection Methods
- Tools of the Trade
- Display Devices
- Input Devices
- Adapter Cards
- Multimedia Devices
- Storage Devices
- Power Supplies
- Memory
- CPUs
- System Boards
- BIOS
- Personal Computer Operating Systems
- Windows User Interface Components
- Windows File System Management
- Windows System Management Tools
- Install, Upgrade, and Optimize Microsoft Windows
- Operating System Utilities
- Maintain and Troubleshoot Microsoft Windows
- Recover Microsoft Windows
- Command Line Interface
- Network Concepts and Communications
- Network Connectivity
- Wireless Networks
- Create Network Connections

- Internet Technologies
- Virtualization
- Install and Configure Web Browser
- Maintain and Troubleshoot Network Connections
- Laptop and Portable Computing Device Components
- Printer and Scanner Technologies
- Printer and Scanner Components
- Printer and Scanner Processes
- Install and Configure Printers and Scanners
- Maintain and Troubleshoot Printers and Scanners
- Security Fundamentals
- Security Protection Measures
- Data and Physical Security
- Wireless Security
- Social Engineering
- Install and Configure Security Measures
- Maintain and Troubleshoot Security Measures
- Virtualization

## Linux+ (Linux Certified Professional)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed to enhance the competencies of the Linux professional. Students will be introduced to multiple Linux distributions and perform installations of three or more distributions, including Red Hat Linux. Basic operational concepts will be taught and practiced. Students will implement security features provided by the Linux operating system. Upon completion of this course, students will have a solid understanding of the Linux operating system and be able to perform basic troubleshooting tasks. Both workstation and server implementations will be covered. This program will provide students with the skills and knowledge necessary to pass the CompTIA Linux+ certification exam.

- Certification program
- 96 Contact Hours, 6 Credit Hours, 12 Weeks

Course No.	Course Name	Quarter Credit Hours	Clock Hours
LIN100	Linux I	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### Prerequisites

Candidates wishing to enter this course should have completed the Microsoft Certified Technology Specialist (MCTS) program or have commensurate experience with PC operating systems and networking.

### Type of Document Received Upon Graduation

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

### Certification Tests

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

### Career Development

Students who successfully complete this program will be prepared for entry to midlevel professional opportunities in the IT field with emphasis on planning, installation, and maintenance of client workstation as well as server operating system, applications and network infrastructure services using the Linux platform and technologies. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Server Support Technician, Server Administrator, Network Administrator, Linux Server Administrator or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1150 Computer Support Specialists

**Recommended Next Course**

Candidates wishing to further their education are recommended to consider the Microsoft certifications in client/server technologies or the Cisco Certified Network Associate (CCNA) programs as the next logical step towards becoming a well rounded IT professional.

## Linux+ Program Details

### COURSE LIN100

Title: Linux+

Exam: CompTIA Exams LX0-101 and LX0-102

#### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises is designed to teach students multiple Linux distributions and perform installations of three or more distributions, including Red Hat Linux. Basic operational concepts will be taught and practiced. Students will implement security features provided by the Linux operating system. Both workstation and server implementations will be covered.

#### **Course Objectives**

This course will cover the following subjects:

- Identify all System Hardware Requirement
- Install Multimedia Options
- Determine what Software & Services should be Installed
- Configure File Systems
- Configure a Boot Manager
- Assign Users, Groups, Passwords, and Permissions Based on Company's Security Policy
- Manage Local Storage Devices & File systems
- Mount & Unmount Varied file systems
- Create Linked Files Using CLI Commands
- Perform & Verify Backups and Restores
- Access & Write Data to Recordable Media
- Identify, Execute, Manage and Kill Process
- Perform Remote Management
- Configure Client Network Services & Settings
- Configure Basic Server Network Services
- Configure a Network Interface Card form a Command Line
- Configure Linux Printing
- Setup Environment Variables
- Configure Security Environment Files
- Use Appropriate Access Level for Login
- Set Daemon & Process Permissions
- Implement Security Auditing for Files & Authentication
- Establish System Performance Baseline
- Troubleshoot errors Using System Logs
- Access System Documentation & Help Files
- Identify & Configure Mass Storage Devices & RAID



## Microsoft Certified System Engineer (MCSE)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed to provide students with the knowledge and skills required for a career in computer networking, with an emphasis on Microsoft server operating systems and infrastructure solutions for both on-premises and cloud environments. Students will be guided through the features of the Microsoft infrastructure solutions and will learn how to implement, manage and maintain both on-premises and cloud data and networking platforms. Additional topics covered are identity management, network infrastructure with Windows and DevOps in Azure. This program will provide students with the skills and knowledge necessary to complete the Microsoft certification exams required to become a Microsoft Certified Solutions Associate (MCSA) for Server and Cloud platforms.

- Certification program
- 480 Contact Hours, 30 Credit Hours, 60 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
MCS100	Windows I	3	48
MCS110	Windows II	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
MCS120	Windows III	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 3

Course No.	Course Name	Quarter Credit Hours	Clock Hours
MCS130	Windows IV	3	48
MCS140	Windows V	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 4

Course No.	Course Name	Quarter Credit Hours	Clock Hours
MCS150	Windows VI	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 5

Course No.	Course Name	Quarter Credit Hours	Clock Hours
MCS160	Windows VII	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### Prerequisites

Candidates wishing to enter this course should have completed the A+ PC Hardware Technician coursework or have commensurate experience with PC hardware and basic operating system concepts.

**Type of Document Received Upon Graduation**

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

**Certification Tests**

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for entry to midlevel professional opportunities in the IT field with emphasis on planning, installation, and maintenance of client workstation as well as server operating system, applications and network infrastructure services using Microsoft technologies. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Desktop and Server Support Technician, Server Administrator, Network Administrator, Windows Server Administrator or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1151 Computer User Support Specialist
- 15-1141 Database Administrators

**Recommended Next Course**

Candidates wishing to further their education are recommended to consider the Cisco Certified Network Associate (CCNA) program or the Linux+ certification course as the next logical step towards becoming a well-rounded IT professional.

## MCSE Program Details

### COURSE MCS100

Title: Installation, Storage, and Compute with Windows Server 2016

Exam: Microsoft Exam 70-740

#### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses primarily on the installation, storage, and compute features and functionality available in Windows Server 2016. It covers general installation tasks and considerations and the installation and configuration of Nano Server, in addition to the creation and management of images for deployment. It also covers local and server storage solutions, including the configuration of disks and volumes, Data Deduplication, High Availability, Disaster Recovery, Storage Spaces Direct, and Failover Clustering solutions. This course also covers Hyper-V and containers, along with the maintenance and monitoring of servers in physical and compute environments.

#### **Course Objectives**

This course will cover the following subjects:

##### *Installing, upgrading, and migrating servers and workloads*

- Introducing Windows Server 2016
- Preparing and installing Server Core
- Preparing for upgrades and migrations
- Migrating server roles and workloads
- Windows Server activation models

##### *Configuring local storage*

- Managing disks in Windows Server
- Managing volumes in Windows Server

##### *Implementing enterprise storage solutions*

- Overview of DAS, NAS, and SANs
- Comparing Fibre Channel, iSCSI, and Fibre Channel over Ethernet
- Understanding iSNS, DCB, and MPIO
- Configuring sharing in Windows Server 2016

##### *Implementing Storage Spaces and Data Deduplication*

- Implementing Storage Spaces
- Managing Storage Spaces
- Implementing Data Deduplication

##### *Installing and configuring Hyper-V and virtual machines*

- Overview of Hyper-V
- Installing Hyper-V
- Configuring storage on Hyper-V host servers
- Configuring networking on Hyper-V host servers
- Configuring Hyper-V virtual machines
- Managing virtual machines

*Deploying and managing Windows and Hyper-V containers*

- Overview of containers in Windows Server 2016
- Deploying Windows Server and Hyper-V containers
- Installing, configuring, and managing containers by using Docker

*Overview of high availability and disaster recovery*

- Defining levels of availability
- Planning high availability and disaster recovery solutions with Hyper-V virtual machines
- Backing up and restoring by using Windows Server Backup
- High availability with failover clustering in Windows Server 2016

*Implementing failover clustering*

- Planning a failover cluster
- Creating and configuring a new failover cluster
- Maintaining a failover cluster
- Troubleshooting a failover cluster
- Implementing site high availability with stretch clustering

*Implementing failover clustering with Windows Server 2016 Hyper-V*

- Overview of the integration of Hyper-V Server 2016 with failover clustering
- Implementing Hyper-V VMs on failover clusters
- Key features for VMs in a clustered environment

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB cluster
- Planning an NLB implementation

*Creating and managing deployment images*

- Introduction to deployment images
- Creating and managing deployment images by using MDT
- Virtual machine environments for different workloads

*Managing, monitoring, and maintaining virtual machine installations*

- WSUS overview and deployment options
- Update management process with WSUS
- Overview of Windows PowerShell DSC
- Overview of Windows Server 2016 monitoring tools
- Using Performance Monitor
- Monitoring event logs

## COURSE MCS110

Title: Networking with Windows Server 2016

Exam: Microsoft Exam 70-741

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the networking features and functionality available in Windows Server 2016. It covers DNS, DHCP, and IPAM implementations, in addition to remote access solutions, such as VPN and Direct Access. It also covers DFS and BranchCache solutions, high performance network features and functionality, and implementation of software-defined networking (SDN) solutions, such as Hyper-V Network Virtualization (HNV) and Network Controller.

### **Course Objectives**

This course will cover the following subjects:

#### *Planning and implementing an IPv4 network*

- Planning IPv4 addressing
- Configuring an IPv4 host
- Managing and troubleshooting IPv4 network connectivity

#### *Implementing DHCP*

- Overview of the DHCP server role
- Deploying DHCP
- Managing and troubleshooting DHCP

#### *Implementing IPv6*

- Overview of IPv6 addressing
- Configuring an IPv6 host
- Implementing IPv6 and IPv4 coexistence
- Transitioning from IPv4 to IPv6

#### *Implementing DNS*

- Implementing DNS servers
- Configuring zones in DNS
- Configuring name resolution between DNS zones
- Configuring DNS integration with Active Directory Domain Services (AD DS)
- Configuring advanced DNS settings

#### *Implementing and managing IPAM*

- Overview of IPAM
- Deploying IPAM
- Managing IP address spaces by using IPAM

#### *Remote access in Windows Server 2016*

- Overview of remote access
- Implementing the Web Application Proxy

#### *Implementing DirectAccess*

- Overview of DirectAccess
- Implementing DirectAccess by using the Getting Started Wizard
- Implementing and managing an advanced DirectAccess infrastructure

*Implementing VPNs*

- Planning VPNs
- Implementing VPNs

*Implementing networking for branch offices*

- Networking features and considerations for branch offices
- Implementing Distributed File System (DFS) for branch offices
- Implementing BranchCache for branch offices

*Configuring advanced networking features*

- Overview of high performance networking features
- Configuring advanced Microsoft Hyper-V networking features

*Implementing Software Defined Networking*

- Overview of SDN
- Implementing network virtualization
- Implementing Network Controller

## COURSE MCS120

Title: Identity with Windows Server 2016

Exam: Microsoft Exam 70-742

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the identity functionality in Windows Server 2016. It covers the installation and configuration of Active Directory Domain Services (AD DS), in addition to Group Policy implementation for non-Nano Server environments. It also covers functionality such as Active Directory Certificate Services (AD CS), Active Directory Federations Services (AD FS), and Web Application proxy implementations.

### **Course Objectives**

This course will cover the following subjects:

#### *Implementing Advanced Network Services*

- Configuring Advanced DHCP Features
- Configuring Advanced DNS Settings
- Implementing IPAM
- Managing IP Address Spaces with IPAM

#### *Implementing Advanced File Services*

- Configuring iSCSI Storage
- Configuring BranchCache
- Optimizing Storage Usage

#### *Implementing Dynamic Access Control*

- Overview of DAC
- Implementing DAC Components
- Implementing DAC for Access Control
- Implementing Access Denied Assistance
- Implementing and Managing Work Folders

#### *Implementing Distributed Active Directory Domain Services Deployments*

- Overview of Distributed AD DS Deployments
- Deploying a Distributed AD DS Environment
- Configuring AD DS Trusts

#### *Implementing Active Directory Domain Services Sites and Replication*

- AD DS Replication Overview
- Configuring AD DS Sites
- Configuring and Monitoring AD DS Replication

#### *Implementing AD CS*

- Using Certificates in a Business Environment
- PKI Overview
- Deploying CAs
- Deploying and Managing Certificate Templates
- Implementing Certificate Distribution and Revocation
- Managing Certificate Recovery

*Implementing Active Directory Rights Management Services*

- AD RMS Overview
- Deploying and Managing an AD RMS Infrastructure
- Configuring AD RMS Content Protection
- Configuring External Access to AD RMS

*Implementing and Administering AD FS*

- Overview of AD FS
- Deploying AD FS
- Implementing AD FS for a Single Organization
- Deploying AD FS in a Business-to-Business Federation Scenario
- Extending AD FS to External Clients

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB Cluster
- Planning an NLB Implementation

*Implementing Failover Clustering*

- Overview of Failover Clustering
- Implementing a Failover Cluster
- Configuring Highly Available Applications and Services on a Failover Cluster
- Maintaining a Failover Cluster
- Implementing a Multi-Site Failover Cluster

*Implementing Failover Clustering with Hyper-V*

- Overview of Integrating Hyper-V with Failover Clustering
- Implementing Hyper-V Virtual Machines on Failover Clusters
- Implementing Hyper-V Virtual Machine Movement

*Implementing Business Continuity and Disaster Recovery*

- Data Protection Overview
- Implementing Windows Server Backup
- Implementing Server and Data Recovery



## COURSE MCS130

Title: Developing Microsoft Azure Solutions

Exam: Microsoft Exam 70-532

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students the opportunity to take an existing web application and expand its functionality as part of moving it to Azure. The course does not require any existing experience with the ASP.NET platform but does require experience with C#. This course focuses on the development considerations and decisions necessary when building a highly available solution in the cloud.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of the Microsoft Azure Platform*

- Azure Services
- Azure Portal

#### *Building Application Infrastructure in Azure*

- Azure Virtual Machines
- Azure Virtual Machine Workloads
- Migrating Azure Virtual Machine Instances
- Highly Available Azure Virtual Machines
- Virtual Machine Configuration Management
- Customizing Azure Virtual Machine Networking
- Virtual Machine Scale Sets

#### *Hosting Web Applications on the Azure Platform*

- Azure Web Apps
- Azure Logic and Function Apps
- Configuring an App Service App
- Publishing an Azure App Service App
- Supplemental Services

#### *Storing SQL Data in Azure*

- Azure SQL Database Overview
- Managing SQL Databases in Azure
- Azure SQL Database Tools
- Securing and Recovering an Azure SQL Database Instance
- Additional Managed Database Services

#### *Designing Cloud Applications for Resiliency*

- Application Design Practices for Highly Available Applications
- Application Analytics
- Building High Performance Applications by Using ASP.NET
- Common Cloud Application Patterns
- Caching Application Data

#### *Storing Unstructured Data in Azure*

- Azure Storage Overview
- Azure Storage Tables
- Azure Redis Cache

- Azure Search
- Azure Cosmos DB

#### *Storing and Consuming Files from Azure Storage*

- Azure Storage Blobs
- Controlling Access to Storage Blobs and Containers
- Configuring Azure Storage Accounts
- Azure Files

#### *Designing a Communication Strategy by Using Queues and Service Bus*

- Azure Storage Queues
- Azure Service Bus
- Azure Service Bus Queues
- Azure Service Bus Relay
- Azure Service Bus Notification Hubs

#### *Automating Integration with Azure Resources*

- Creating Azure Scripts using Azure PowerShell
- Creating Azure Scripts using Azure CLI
- Azure Resource Manager
- Azure REST Interface
- Azure Cloud Shell

#### *DevOps in Azure*

- Continuous Integration
- Azure DevTest Labs
- Azure Resource Manager Templates
- Managed Solution Hosting

#### *Securing Azure Web Applications*

- Azure Active Directory
- Azure AD Directories
- Azure AD Offerings
- Azure Key Vault

## COURSE MCS140

Title: Implementing Microsoft Azure Infrastructure Solutions

Exam: Microsoft Exam 70-533

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises is for students who are experienced in implementing an infrastructure solution in Microsoft Azure. Students have experience implementing and monitoring cloud and hybrid solutions as well as supporting application lifecycle management. This course teaches IT professionals how to provision and manage services in Microsoft Azure. Students will learn how to implement infrastructure components such as virtual networks, virtual machines, containers, web and mobile apps, and storage in Azure. Students also will learn how to plan for and manage Azure AD, and configure Azure AD integration with on-premises Active Directory domains.

### **Course Objectives**

This course will cover the following subjects:

#### *Introduction to Azure*

- Cloud technology overview
- Overview of Azure
- Managing Azure with the Azure portal
- Managing Azure with Windows PowerShell
- Managing Azure with Azure CLI
- Overview of Azure deployment models
- Managing and monitoring Azure resources

#### *Implementing and managing Azure networking*

- Overview of Azure networking
- Implementing and managing virtual networks
- Configuring an Azure virtual network
- Configuring virtual network connectivity
- Overview of Azure classic networking

#### *Implementing virtual machines*

- Overview of Azure VMs
- Planning deployment of Azure VMs
- Deploying Azure VMs
- Overview of classic Azure VMs

#### *Managing Azure VMs*

- Configuring Azure VMs
- Managing disks of Azure VMs
- Managing and monitoring Azure VMs
- Managing classic Azure VMs

#### *Implementing Azure App Service*

- Introduction to App Service
- Planning app deployment in App Service
- Implementing and maintaining web apps
- Configuring web apps
- Monitoring web apps and WebJobs
- Implementing mobile apps

- Implementing Traffic Manager

*Planning and implementing storage, backup, and recovery services*

- Planning storage
- Implementing and managing Azure Storage
- Implementing Azure CDNs
- Implementing Azure Backup
- Planning and implementing Azure Site Recovery

*Implementing containers in Azure*

- Implementing Windows and Linux containers in Azure
- Implementing Azure Container Service

*Implementing Azure Cloud Services*

- Planning and deploying Azure Cloud Services
- Managing and maintaining Azure Cloud Services

*Implementing Azure Active Directory*

- Creating and managing Azure AD tenants
- Configuring application and resource access with Azure AD
- Overview of Azure AD Premium

*Managing an Active Directory infrastructure in a hybrid environment*

- Extending an on-premises Active Directory domain to Azure IaaS
- Implementing directory synchronization by using Azure AD Connect
- Implementing SSO in hybrid scenarios

*Implementing Azure-based management and automation*

- Implementing OMS
- Implementing Azure Automation
- Implementing Automation runbooks
- Implementing Azure Automation-based management

## COURSE MCS150

Title: Architecting Microsoft Azure Solutions

Exam: Microsoft Exam 70-535

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students skills to define the appropriate cloud native, cloud migration, and hybrid cloud solutions to meet the required functional, operational, and deployment requirements through the solution lifecycle. Students should know the features and capabilities of Azure services to be able to identify tradeoffs and make decisions for designing public and hybrid cloud solutions. Students should understand DevOps technologies, provisioning Azure resources using ARM templates, and designing highly resilient workloads running on Azure. This course is intended for architects who have experience building infrastructure and applications on the Microsoft Azure platform. Students should have a thorough understanding of most services offered on the Azure platform.

### **Course Objectives**

This course will cover the following subjects:

#### *Application Architecture Patterns in Azure*

- Pattern Resources
- Performance Patterns
- Resiliency Patterns
- Scalability Patterns
- Data Patterns

#### *Deploying Resources with Azure Resource Manager*

- ARM Templates
- Role-Based Access Control (RBAC)
- Resource Policies
- Security
- Building Blocks

#### *Building Azure IaaS-Based Server Applications*

- High Availability
- Templated Infrastructure
- Domain-Connected Machines

#### *Creating Managed Server Applications in Azure*

- Infrastructure-Backed Platform-as-a-Service (PaaS)
- High-Performance Compute (HPC)
- Migration

#### *Authoring Serverless Applications in Azure*

- Azure Web App
- Azure Functions
- Integration
- High Performance

#### *Backing Azure Solutions with Azure Storage*

- Pricing
- Blob Storage
- Files
- StorSimple

#### *Comparing Database Options in Azure*

- Relational
- NoSQL Services
- Azure Cosmos DB
- Data Storage
- Data Analysis

#### *Networking Azure Application Components*

- VNets
- Load Balancing
- External Connectivity
- Hybrid Connectivity

#### *Managing Security and Identity for Azure Solutions*

- Security Monitoring
- Data Security
- Application Security Azure Active Directory (Azure AD)
- Hybrid Identity
- Azure AD Application Integration

#### *Integrating SaaS Services Available on the Azure Platform*

- Cognitive Services
- Bot Services
- Machine Learning
- Media Services

#### *Integrating Azure Solution Components using Messaging Services*

- Event Messaging
- Integration
- IoT

#### *Monitoring and Automating Azure Solutions*

- Application Monitoring
- Platform Monitoring
- Network Monitoring
- Alerting
- Backup
- Azure Automation
- Config Management
- Auto-Scale

## COURSE MCS160

Title: Configuring and Operating a Hybrid Cloud with Microsoft Azure Stack

Exam: Microsoft Exam 70-537

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides the skills students need as Azure administrators and Azure Stack operators who use Azure Stack to provide cloud services to their end users or customers from within their own data center. Students for this course should have significant experience managing and operating Azure Stack environments. Students should have a strong understanding of Azure as well as some knowledge of virtualization, networking, and identity management. Students should also understand how Azure Stack enables DevOps processes and the hybrid development model. Students will learn the ability to plan, deploy, package, update, and maintain the Azure Stack infrastructure. Students will also learn the ability to offer hybrid cloud resources and requested services, and to manage infrastructure as a service (IaaS) and platform as a service (PaaS). This course is intended for service administrators, DevOps and cloud architects who are interested in using Microsoft Azure Stack to provide cloud services to their end-users or customers from within their own datacenter.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of Azure Stack*

- What is Azure Stack?
- Comparing Azure Stack with Microsoft Azure
- Comparing Azure Stack to Windows Azure Pack

#### *Foundational Components of Microsoft Azure Stack*

- Windows Server 2016 and System Center 2016
- Identity and Authentication

#### *Deploying Microsoft Azure Stack*

- Microsoft Azure Stack Architecture
- Azure Stack Prerequisites
- Installing Azure Stack

#### *Offering Microsoft Azure Stack Resources*

- Working with Plans and Offers
- Microsoft Azure Stack Marketplace
- Enabling Multi-Tenancy in Azure Stack
- Integrating Azure Stack with Windows Azure Pack

#### *Microsoft Azure Stack and DevOps*

- Technologies used in Microsoft Azure Stack for DevOps
- Azure Resource Manager Templates
- Third-party Resource Providers

#### *Infrastructure as a Service and Microsoft Azure Stack*

- Software Defined Networking improvements with Microsoft Azure Stack and Windows Server 2016
- Azure Stack Storage
- Virtual Machines in Microsoft Azure Stack

*Platform as a Service and Microsoft Azure Stack*

- Understanding the Platform as a Service
- SQL Server and MySQL Server Providers in Microsoft Azure Stack
- App Service Resource Provider
- Azure Key Vault
- Azure Functions



## Cisco Certified Network Associate (CCNA)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises validates the ability to install, configure, operate, and troubleshoot medium-size route and switched networks, including implementation and verification of connections to remote sites in a WAN. CCNA curriculum includes basic mitigation of security threats, introduction to wireless networking concepts and terminology, and performance-based skills. This new curriculum also includes (but is not limited to) the use of these protocols: IP, Enhanced Interior Gateway Routing Protocol (EIGRP), Serial Line Interface Protocol Frame Relay, Routing Information Protocol Version 2 (RIPv2), VLANs, Ethernet, access control lists (ACLs).

- Certification program
- 96 Contact Hours, 6 Credit Hours, 12 Weeks

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCA100	Administration I	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### Prerequisites

Candidates wishing to enter this course should have completed either a Microsoft or Linux+ networking program or have commensurate experience with PC networking and TCP/IP.

### Type of Document Received Upon Graduation

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

### Certification Tests

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

### Career Development

Students who successfully complete this program will be prepared for entry to midlevel professional opportunities in the IT field with emphasis on installation, configuration and maintenance of Local Area Network (LAN) infrastructure. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Network Engineer, Network Support Specialist, Local Area Network Engineer, Network Systems Engineer or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1142 Network and Computer System Administrators
- 15-1152 Computer Network Support Specialist

### Recommended Next Course

Candidates wishing to further their education are recommended to consider the Cisco Certified Network Professional (CCNP) program as the next logical step towards becoming a well rounded IT professional.

## CCNA Program Details

### COURSE CCA100

Title: Cisco Certified Network Associate

Exam: 200-125

#### Course Description

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers basic networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized. This is an advanced course providing the skills and knowledge necessary to pass the Cisco certification exam (one exam) necessary to become a Cisco Certified Network Associate (CCNA).

#### Course Objectives

This course will cover the following subjects:

##### *Operation of IP Data Networks*

- Recognize the purpose and functions of various network devices such as Routers, Switches, Bridges and Hubs<sup>[SEP]</sup>
- Select the components required to meet a given network specification<sup>[SEP]</sup>
- Identify common applications and their impact on the network<sup>[SEP]</sup>
- Describe the purpose and basic operation of the protocols in<sup>[SEP]</sup>the OSI and TCP/IP models<sup>[SEP]</sup>
- Predict the data flow between two hosts across a network<sup>[SEP]</sup>
- Identify the appropriate media, cables, ports, and connectors<sup>[SEP]</sup>to connect Cisco network devices to other network devices and hosts in a LAN

##### *LAN Switching Technologies*

- Determine the technology and media access control method for Ethernet networks<sup>[SEP]</sup>
- Identify basic switching concepts and the operation of Cisco switches
- Configure and verify initial switch configuration including remote access management
- Verify network status and switch operation using basic utilities
- Describe how VLANs create logically separate networks and the need for routing between them
- Configure and verify VLANs<sup>[SEP]</sup>
- Configure and verify trunking on Cisco switches
- Identify enhanced switching technologies
- Configure and verify PVSTP operation

##### *IP Addressing*

- Describe the operation and necessity of using private and public IP addresses for IPv4 addressing<sup>[SEP]</sup>
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Identify the appropriate IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Describe the technological requirements for running IPv6 in conjunction with IPv4
- Describe IPv6 addresses

##### *IP Routing Technologies*

- Describe basic routing concepts
- Configure and verify utilizing the CLI to set basic router configuration

- Configure and verify operation status of a device interface
- Verify router configuration and network connectivity using
- Configure and verify routing configuration for a static or default route given specific routing requirements<sup>[1][1]</sup><sub>[SEP]</sub>
- Differentiate methods of routing and routing protocols
- Configure and verify OSPF
- Configure and verify interVLAN routing (Router on a stick)
- Configure SVI interfaces<sup>[1][1]</sup><sub>[SEP]</sub>
- Manage Cisco IOS Files
- Configure and verify EIGRP (single AS)

#### *IP Services*

- Configure and verify DHCP (IOS Router)
- Describe the types, features, and applications of ACLs
- Configure and verify ACLs in a network environment
- Identify the basic operation of NAT
- Configure and verify NAT for given network requirements<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify NTP as a client<sup>[1][1]</sup><sub>[SEP]</sub>
- Recognize High availability (FHRP)
- Configure and verify syslog
- Describe SNMP v2 and v3

#### *Network Device Security*

- Configure and verify network device security features
- Configure and verify switch port security
- Configure and verify ACLs to filter network traffic<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify an ACLs to limit telnet and SSH access to the router

#### *Troubleshooting*

- Troubleshoot and correct common problems associated with IP addressing and host configurations<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve VLAN problems
- Troubleshoot and resolve trunking problems on Cisco switches
- Troubleshoot and resolve ACL issues
- Troubleshoot and resolve Layer 1 problems
- Identify and correct common network problems<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve spanning tree operation issues
- Troubleshoot and resolve routing issues
- Troubleshoot and resolve OSPF problems
- Troubleshoot and resolve EIGRP problems
- Troubleshoot and resolve interVLAN routing problems
- Troubleshoot and resolve WAN implementation issues
- Monitor NetFlow statistics<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot EtherChannel problems

#### *WAN Technologies*

- Identify different WAN Technologies
- Configure and verify a basic WAN serial connection<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify a PPP connection between Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify frame relay on Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Implement and troubleshoot PPPoE

## Cisco Certified Network Professional (CCNP Routing & Switching)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed to build advanced or journeyman knowledge of both LAN and WAN infrastructure implementations in a Cisco environment. This set of courses builds on the concepts introduced in the CCNA program. Students will be exposed to more in-depth concepts relating to routing implementation and design; TCP/IP design strategies; switching concepts; WAN optimization and performance issues; as well as, basic troubleshooting/support techniques and approaches. Some of the many protocols that will be studied include: TCP/IP, RIP, EIGRP, OSPF, IS-IS, BGP. Other topics include: VLAN implementation and management; spanning-tree protocol; multicast management; remote access implementation; Cisco security features including AAA; subnet concepts, design considerations, and implementation; VLSM; CIDR and more. These are advanced courses providing the skills and knowledge necessary to pass the Cisco certification exams (three exams) necessary to become a Cisco Certified Network Professional (CCNP).

- Certification program
- 192 Contact Hours, 12 Credit Hours, 24 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCP100	Professional I	3	48
CCP110	Professional II	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCP120	Professional III	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### Prerequisites

Candidates wishing to enter this course should have completed the Cisco Certified Network Associate program or have commensurate experience WAN technologies in a Cisco environment.

### Type of Document Received Upon Graduation

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

### Certification Tests

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for midlevel professional opportunities in the IT field with emphasis on design, installation, and configuration of Local Area Network (LAN) and Wide Area Network (WAN) infrastructure. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Sr. Network Engineer, Sr. Network Support Specialist, SR. WAN Engineer, Sr. LAN/WAN Engineer or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1152 Computer Network Support Specialists
- 15-1143 Computer Network Architects
- 25-1021 Computer Science Teachers, Postsecondary

**Recommended Next Course**

Candidates wishing to further their education are recommended to consider the Cisco Certified Security Professional (CCNP Security) program as the next logical step towards becoming a well rounded IT professional.

## CCNP Program Details

### COURSE CCP100

Title: Implementing Cisco IP Routing

Exam: 300-101

#### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to use advanced IP addressing and routing in implementing scalability for Cisco ISR routers connected to LANs and WANs. The exam covers topics on Advanced IP Addressing, Routing Principles, Multicast Routing, IPv6, Manipulating Routing Updates, Configuring basic BGP, Configuring EIGRP, OSPF, and IS-IS.

#### **Course Objectives**

This course will cover the following subjects:

- Identify Cisco Express Forwarding Concepts
- Explain General Network Challenges
- Describe IP Operations
- Explain TCP Operations
- Describe UDP Operations
- Recognize Proposed Changes to the Network
- Configure and Verify PPP
- Explain Frame Relay
- Identify, Configure, and Verify IPv4 addressing and subnetting
- Identify IPv6 Addressing and Subnetting
- Configure and Verify Static Routing
- Configure and Verify Default Routing
- Evaluate Routing Protocol Types
- Configure and Verify GRE
- Describe DMVPN
- Describe Easy Virtual Networking
- Describe IOS AAA Using Local Database
- Describe Device Security Using IOS AAA with TACACS+ and RADIUS
- Configure and Verify Device Access Control
- Configure and Verify Router Security Features
- Configure and Verify Device Management
- Configure and Verify SNMP
- Configure and Verify Logging
- Configure and Verify Network Time Protocol
- Configure and Verify IPv4 and IPv6 DHCP
- Configure and Verify IPv4 Network Address Translation
- Describe IPv6 NAT
- Describe SLA Architecture
- Configure and Verify IP SLA
- Configure and Verify Tracking Objects
- Configure and Verify Cisco NetFlow

## COURSE CCP110

Title: Implementing Cisco Switched Networks

Exam: 300-115

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to implement scalable multilayer switched networks. The exam includes topics on Campus Networks, describing and implementing advanced Spanning Tree concepts, VLANs and Inter-VLAN routing, High Availability, Wireless Client Access, Access Layer Voice concepts, and minimizing service Loss and Data Theft in a Campus Network.

### **Course Objectives**

This course will cover the following subjects:

- Configure and Verify Switch Administration
- Configure and Verify Layer 2 Protocols
- Configure and Verify VLANs
- Configure and Verify Trunking
- Configure and Verify EtherChannels
- Configure and Verify Spanning Tree
- Configure and Verify Other LAN Switching Technologies
- Describe Chassis Virtualization and Aggregation Technologies
- Configure and Verify Switch Security Features
- Describe Device Security Using Cisco IOS AA with TACACS+ and RADIUS
- Configure and Verify First-Hop Redundancy Protocols

## COURSE CCP120

Title: Troubleshooting and Maintaining Cisco IP Networks

Exam: 300-135

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to secure and expand the reach of an enterprise network to (1) plan and perform regular maintenance on complex enterprise routed and switched networks and (2) use technology-based practices and a systematic ITIL-compliant approach to perform network troubleshooting.

### **Course Objectives**

This course will cover the following subjects:

- Use Cisco IOS Troubleshooting Tools
- Apply Troubleshooting methodologies
- Troubleshoot Switch Administration
- Troubleshoot Layer 2 Protocols
- Troubleshoot VLANs
- Troubleshoot Trunking
- Troubleshoot EtherChannels
- Troubleshoot Spanning Tree
- Troubleshoot other LAN Switching Technologies
- Troubleshoot Chassis Virtualization and Aggregation Technologies
- Troubleshoot IPv4 Addressing and Subnetting
- Troubleshoot IPv6 Addressing and Subnetting
- Troubleshoot Static Routing
- Troubleshoot Default Routing
- Troubleshoot Administrative Distance
- Troubleshoot GRE
- Troubleshoot IOS AAA using Local Database
- Troubleshoot Device Access Control
- Troubleshoot Router Security Features
- Troubleshoot Device Management
- Troubleshoot SNMP
- Troubleshoot Logging
- Troubleshoot Network Time Protocol
- Troubleshoot IPv4 and IPv6 DHCP
- Troubleshoot IPv4 Network Address Translation
- Troubleshoot SLA Architecture
- Troubleshoot Tracking Objects



## Cisco Certified Security Professional (CCSP)

### Program Summary

This program covers advanced topics and concepts related to securing Cisco networks. This course covers a wide array of security topics including: Cisco IOS firewall implementation; PIX firewall technology and features; VPN concepts and implementation; IPsec; implementation and design of intrusion detection systems; Cisco's SAFE implementation; AAA; protocol monitoring and management and much more. The goal of this course is to give the student the tools and knowledge necessary to secure and manage complex network infrastructures – protecting data and productivity, as well as, reducing costs. These are advanced courses providing the skills and knowledge necessary to pass the Cisco certification exams necessary to become a Cisco Certified Network Professional. (CCNP Security).

- Certification program
- 288 Contact Hours, 18 Credit Hours, 36 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CSP100	Security I	3	48
CSP110	Security II	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CSP120	Security III	3	48
CSP130	Security IV	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 3

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CSP140	Security V	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### Prerequisites

Candidates wishing to enter this course should have completed the Cisco Certified Network Professional program, the Cisco Certified Network Associate program or have commensurate experience in with Cisco routers and network infrastructure implementation.

### Type of Document Received Upon Graduation

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

### Certification Tests

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for midlevel to advanced level professional opportunities in the IT field with emphasis on network security including installation, configuration and maintenance security components supported in a Local Area Network (LAN) and Wide Area Network (WAN) infrastructure. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Network Security Engineer, Network Security Support Specialist, Network Security Administrator, Sr. Network Security Engineer or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1122 Information Security Analysts
- 25-1021 Computer Science Teacher, Postsecondary

**Recommended Next Course**

Candidates wishing to further their education are recommended to consider the CCIE program as the next logical step towards becoming an expert IT professional.

## CCSP Program Details

### COURSE CSP100

Title: Implementing Cisco IOS Network Security

Exam: 210-260

#### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the CCNA Security certification. This exam tests a candidate's knowledge of securing Cisco routers and switches and their associated networks. It leads to validated skills for installation, troubleshooting and monitoring of network devices to maintain integrity, confidentiality and availability of data and devices and develops competency in the technologies that Cisco uses in its security infrastructure.

#### **Course Objectives**

This course will cover the following subjects:

##### *Security Concepts*

- Common security principles
- Describe confidentiality, integrity, availability (CIA)
- Describe SIEM technology
- Identify common security terms
- Identify common network security zones
- Common security threats
- Identify common network attacks
- Describe social engineering
- Identify malware
- Classify the vectors of data loss/exfiltration
- Cryptography concepts
- Describe key exchange
- Describe hash algorithm
- Compare and contrast symmetric and asymmetric encryption
- Describe digital signatures, certificates, and PKI
- Describe network topologies
- Campus area network (CAN)
- Cloud, wide area network (WAN)
- Data center
- Small office/home office (SOHO)
- Network security for a virtual environment

##### *Secure Access*

- Secure management
- Compare in-band and out-of band
- Configure secure network management
- Configure and verify secure access through SNMP v3 using an ACL
- Configure and verify security for NTP
- Use SCP for file transfer
- AAA concepts
- Describe RADIUS and TACACS+ technologies
- Configure administrative access on a Cisco router using TACACS+
- Verify connectivity on a Cisco router to a TACACS+ server
- Explain the integration of Active Directory with AAA

- Describe authentication and authorization using ACS and ISE
- 802.1X authentication
- Identify the functions 802.1X components
- BYOD
- Describe the BYOD architecture framework
- Describe the function of mobile device management (MDM)

#### *VPN*

- VPN concepts
- Describe IPsec protocols and delivery modes (IKE, ESP, AH, tunnel mode, transport mode)
- Describe hairpinning, split tunneling, always-on, NAT traversal
- Remote access VPN
- Implement basic clientless SSL VPN using ASDM
- Verify clientless connection
- Implement basic AnyConnect SSL VPN using ASDM
- Verify AnyConnect connection
- Identify endpoint posture assessment
- Site-to-site VPN
- Implement an IPsec site-to-site VPN with pre-shared key authentication on Cisco routers and ASA firewalls
- Verify an IPsec site-to-site VPN

#### *Secure Routing and Switching*

- Security on Cisco routers
- Configure multiple privilege levels
- Configure Cisco IOS role-based CLI access
- Implement Cisco IOS resilient configuration
- Securing routing protocols
- Implement routing update authentication on OSPF
- Securing the control plane
- Explain the function of control plane policing
- Common Layer 2 attacks
- Describe STP attacks
- Describe ARP spoofing
- Describe MAC spoofing
- Describe CAM table (MAC address table) overflows
- Describe CDP/LLDP reconnaissance
- Describe VLAN hopping
- Describe DHCP spoofing
- Mitigation procedures
- Implement DHCP snooping
- Implement Dynamic ARP Inspection
- Implement port security
- Describe BPDU guard, root guard, loop guard
- Verify mitigation procedures
- VLAN security
- Describe the security implications of a PVLAN
- Describe the security implications of a native VLAN

#### *Cisco Firewall Technologies*

- Describe operational strengths and weaknesses of the different firewall technologies
- a Proxy firewalls
- Application firewall

- Personal firewall
- Compare stateful vs. stateless firewalls
- Operations
- Function of the state table
- Implement NAT on Cisco ASA 9.x
- Static
- Dynamic
- PAT
- Policy NAT
- Verify NAT operations
- Implement zone-based firewall
- Zone to zone
- Self Zone
- Firewall features on the Cisco Adaptive Security Appliance (ASA) 9.x
- Configure ASA access management
- Configure security access policies
- Configure Cisco ASA interface security levels
- Configure default Cisco Modular Policy Framework (MPF)
- Describe modes of deployment (routed firewall, transparent firewall)
- Describe methods of implementing high availability
- Describe security contexts
- Describe firewall services

#### *IPS*

- Describe IPS deployment considerations
- Network-based IPS vs. host-based IPS
- Modes of deployment (inline, promiscuous - SPAN, tap)
- Placement (positioning of the IPS within the network)
- False positives, false negatives, true positives, true negatives
- Describe IPS technologies
- Rules/signatures
- Detection/signature engines
- Trigger actions/responses (drop, reset, block, alert, monitor/log, shun)
- Blacklist (static and dynamic)

#### *Content and Endpoint Security*

- Describe mitigation technology for email-based threats
- SPAM filtering, anti-malware filtering, DLP, blacklisting, email encryption
- Describe mitigation technology for web-based threats
- Local and cloud-based web proxies
- Blacklisting, URL filtering, malware scanning, URL categorization, web application filtering, TLS/SSL decryption
- Describe mitigation technology for endpoint threats
- Anti-virus/anti-malware
- Personal firewall/HIPS
- Hardware/software encryption of local data

## COURSE CSP110

Title: Implementing Cisco Secure Access Solutions (SISAS)

Exam: 300-208

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is one of the exams associated with the CCNP Security certification. This course will cover the components and architecture of secure access, by utilizing 802.1X and Cisco TrustSec. It includes knowledge of Cisco Identity Services Engine (ISE) architecture, solution, and components as an overall network threat mitigation and endpoint control solutions. It also includes the fundamental concepts of bring your own device (BYOD) using posture and profiling services of ISE. Candidates can prepare for this exam by taking the Implementing Cisco Secure Access Solutions (SISAS) course.

### **Course Objectives**

This course will cover the following subjects:

- Threat Mitigation through Identity Services
- Identity Services
- 802.1X and EAP
- Configure 802.1X Components
- ISE Fundamentals
- Describe Cisco ISE Features and configure the fundamentals
- Cisco ISE with PKI
- Cisco ISE Authentication
- Cisco ISE with External Authentication
- Advance Access Control
- Certificate Based User Authentication
- Authorization
- Cisco TrustSec
- Web Authentication and Guest Access
- Web Authentication
- Guest Access Services
- Endpoint
- Posture
- Profiler
- BYOD
- Troubleshooting Network Access Control
- Troubleshooting ISE
- View More

## COURSE CSP120

Title: Implementing Cisco Edge Network Security Solutions (SENS)

Exam: 300-206

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is one of the exams associated with the CCNP Security. The Implementing Cisco Edge Network Security Course includes the knowledge of a network security engineer to configure and implement security on Cisco network perimeter edge devices such as a Cisco switch, Cisco router, and Cisco ASA firewall. This course focuses on the technologies used to strengthen security of a network perimeter such as Network Address Translation (NAT), ASA policy and application inspect, and a zone-based firewall on Cisco routers.

### **Course Objectives**

This course will cover the following subjects:

- Secure Design Principles
- Course Overview
- Network Security Zoning
- Cisco Module Network Security Architecture
- Cisco SecureX Architecture
- Cisco TrustSec Solution
- Deploying Network Infrastructure Protection
- Introducing Cisco Network Infrastructure Protection
- Deploying Cisco IOS Control Plane Security Controls
- Deploying Cisco IOS Management Plane Security Controls
- Deploying Cisco ASA Management Plane Security Controls
- Deploying Cisco Traffic Telemetry Methods
- Deploying Cisco IOS Layer 2 and Layer 3 Data Plane Security Controls
- Deploying NAT on Cisco IOS and Cisco ASA
- Introducing Network Address Translation
- Deploying Cisco ASA Network Address Translation
- Deploying Cisco IOS Software Network Address Translation
- Deploying Threat Controls on Cisco ASA
- Introducing Cisco Firewall Threat Controls
- Deploying Basic Cisco ASA Access Policies
- Deploying Advanced Cisco ASA Application Inspection Policies
- Deploying Cisco ASA Botnet Traffic Filtering
- Deploying Cisco ASA Identity Based Firewall
- Deploying Threat Controls on Cisco IOS Software
- Deploying Basic Cisco IOS Software with Basic Zone-Based Firewall Access Policies
- Deploying Advanced Cisco IOS Software ZBFW with Application Inspection Policies

## COURSE CSP130

Title: Implementing Cisco Secure Mobility Solutions (SIMOS)

Exam: 300-209

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the Implementing Cisco Secure Mobility Solutions (SIMOS) tests a network security engineer on the variety of Virtual Private Network (VPN) solutions that Cisco has available on the Cisco ASA firewall and Cisco IOS software platforms. This course provides the knowledge necessary to properly implement highly secure remote communications through VPN technology, such as remote access SSL VPN and site-to-site VPN (DMVPN, FlexVPN). Candidates can prepare for this exam by taking the Implementing Cisco Secure Mobility Solutions (SIMOS) course.

### **Course Objectives**

This course will cover the following subjects:

- Fundamentals of VPN Technologies and Cryptography
- The Role of VPNs in Network Security
- VPNs and Cryptography
- Deploying Secure Site-to-Site Connectivity Solutions
- Introducing Cisco Secure Site-to-Site Connectivity Solutions
- Deploying Point-to-Point IPsec VPNs on the Cisco ASA
- Deploying Cisco IOS VTI-Based Point-to-Point IPsec VPNs
- Deploying Cisco IOS DMVPNs
- Deploying Cisco IOS Site-to-Site FlexVPN Solutions
- Introducing Cisco IOS Site-to-Site FlexVPN Solutions
- Deploying Point-to-Point IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Hub-and-Spoke IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Spoke-to-Spoke IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Basic Cisco Clientless SSL VPN
- Clientless SSL VPN Overview
- Deploying Basic Cisco Clientless SSL VPN on Cisco ASA
- Deploying Application Access in Cisco ASA Clientless SSL VPN
- Deploying Advanced Authentication and Authorization in Clientless SSL VPN
- Deploying Cisco AnyConnect VPNs
- Deploying Basic Cisco AnyConnect SSL VPN on Cisco ASA
- Deploying Advanced Cisco AnyConnect SSL VPN on Cisco ASA
- Deploying Advanced Authentication and Authorization in Cisco AnyConnect VPNs
- Deploying Cisco AnyConnect IPsec/IKEv2 VPNs
- Deploying Endpoint Security and Dynamic Access Policies
- Implementing Host Scan
- Implementing DAP for SSL VPNs



## COURSE CSP140

Title: Implementing Cisco Threat Control Solutions (SITCS)

Exam: 300-210

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the Cisco Certified Network Professional Security certification. The Implementing Cisco Threat Control Solutions (SITCS) provides a network security engineer on advanced firewall architecture and configuration with the Cisco next-generation firewall, utilizing access and identity policies. This Course covers integration of Intrusion Prevention System (IPS) and context-aware firewall components, as well as Web (Cloud) and Email Security solutions. Candidates can prepare for this exam by taking the Implementing Cisco Threat Control Solutions (SITCS) course.

### **Course Objectives**

This course will cover the following subjects:

- Cisco Web Security Appliance
- Cisco Web Security Appliance (WSA) Solutions
- Integrating the Cisco Web Security Appliance
- Configuring Cisco Web Security Appliance Identities and User Authentication Controls
- Configuring Cisco Web Security Appliance Acceptable Use Control
- Configuring Cisco Web Security Appliance Anti-Malware Controls
- Configuring Cisco Web Security Appliance Decryption
- Configuring Cisco Web Security Appliance Data Security Controls
- Cisco Cloud Web Security
- Cisco Cloud Web Security Solutions
- Configuring Cisco Cloud Web Security Connectors
- Web Filtering Policy in Cisco ScanCenter
- Cisco Email Security Appliance
- Cisco Email Security Solutions
- Cisco Email Security Appliance Basic Setup Components
- Configuring Cisco Email Security Appliance Basic Incoming and Outgoing Mail Policies
- Advanced Malware Protection for Endpoints
- AMP for Endpoints Overview and Architecture
- Customizing Detection and AMP Policy
- IOCs and IOC Scanning
- Deploying AMP Connectors
- AMP Analysis Tools
- Cisco FirePOWER Next-Generation IPS
- Cisco FireSIGHT System
- Configuring and Managing Cisco FirePOWER Devices
- Implementing an Access Control Policy
- Discovery Technology
- Configuring File-Type and Network Malware Detection
- Managing SSL Traffic with Cisco FireSIGHT
- IPS Policy and Configuration Concepts
- Network Analysis Policy
- Creating Reports
- Correlation Rules and Policies
- Basic Rule Syntax and Usage
- Cisco ASA FirePOWER Services
- Installing Cisco ASA 5500-X Series FirePOWER Services (SFR)

## Certified Desktop & Network Specialist (CDNS)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed for the novice with no computer experience. Students will be introduced to basic networking concepts and network implementation using Microsoft Windows Operating System – a must for any individual planning to enter the IT field.

This program is also designed to provide students with the knowledge required for entry-level careers in computer networking, with an emphasis on Microsoft operating systems including Windows Server 2016. Students will be guided through the features of the Microsoft operating systems will learn how implement, manage and maintain both workstations and servers in a Microsoft Windows networking environment. Additional topics include network infrastructure services that are required to support a Windows network including Active Directory, Name Resolution, TCP/IP and IP assignment, Windows Security, Remote Access, and Microsoft Exchange 2010. This program will provide students with the skills and knowledge necessary to complete the CompTIA A+ and Microsoft Certified System Engineer (MCSE) certification exams.

In addition, this course will equip administrators with knowledge, skills, and abilities to build and run a VMware vSphere environment. This course focuses on the installation and configuration of VMware ESXi hosts and VMware vCenter Server. This course also focuses on the management of ESXi hosts and virtual machines with vCenter Server. This course will help prepare IT professionals to achieve the status of VMware Certified Professional on vSphere 6.5.

- Certification program
- 624 Contact Hours, 39 Credit Hours, 78 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN100	Desktop I	3	48
CDN110	Desktop II	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN120	Desktop III	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 3

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN130	Desktop IV	3	48
CDN140	Desktop V	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 4**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN150	Desktop VI	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 5**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN160	Desktop VII	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 6**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN170	Desktop VIII	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 7**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CDN180	Desktop VIII	3	48
<b>Total</b>		<b>6</b>	<b>48</b>

**Prerequisites**

There are no prerequisites required to attend this course.

**Type of Document Received Upon Graduation**

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

**Certification Tests**

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for entry to midlevel professional opportunities in the IT field with emphasis on planning, installation, and maintenance of client workstation hardware and software as well as server operating system, applications and network infrastructure services using Microsoft technologies. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Desktop and Server Support Technician, Server Administrator, Network Administrator, Windows Server Administrator or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1151 Computer User Support Specialist
- 25-1021 Computer Science Teacher, Postsecondary
- 17-2061 Computer Hardware Engineers
- 15-1141 Database Administrators

## CDNS Program Details

### COURSE CDN100

Title: Installation, Storage, and Compute with Windows Server 2016

Exam: Microsoft Exam 70-740

#### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses primarily on the installation, storage, and compute features and functionality available in Windows Server 2016. It covers general installation tasks and considerations and the installation and configuration of Nano Server, in addition to the creation and management of images for deployment. It also covers local and server storage solutions, including the configuration of disks and volumes, Data Deduplication, High Availability, Disaster Recovery, Storage Spaces Direct, and Failover Clustering solutions. This course also covers Hyper-V and containers, along with the maintenance and monitoring of servers in physical and compute environments.

#### **Course Objectives**

This course will cover the following subjects:

##### *Installing, upgrading, and migrating servers and workloads*

- Introducing Windows Server 2016
- Preparing and installing Server Core
- Preparing for upgrades and migrations
- Migrating server roles and workloads
- Windows Server activation models

##### *Configuring local storage*

- Managing disks in Windows Server
- Managing volumes in Windows Server

##### *Implementing enterprise storage solutions*

- Overview of DAS, NAS, and SANs
- Comparing Fibre Channel, iSCSI, and Fibre Channel over Ethernet
- Understanding iSNS, DCB, and MPIO
- Configuring sharing in Windows Server 2016

##### *Implementing Storage Spaces and Data Deduplication*

- Implementing Storage Spaces
- Managing Storage Spaces
- Implementing Data Deduplication

##### *Installing and configuring Hyper-V and virtual machines*

- Overview of Hyper-V
- Installing Hyper-V
- Configuring storage on Hyper-V host servers
- Configuring networking on Hyper-V host servers
- Configuring Hyper-V virtual machines
- Managing virtual machines

*Deploying and managing Windows and Hyper-V containers*

- Overview of containers in Windows Server 2016
- Deploying Windows Server and Hyper-V containers
- Installing, configuring, and managing containers by using Docker

*Overview of high availability and disaster recovery*

- Defining levels of availability
- Planning high availability and disaster recovery solutions with Hyper-V virtual machines
- Backing up and restoring by using Windows Server Backup
- High availability with failover clustering in Windows Server 2016

*Implementing failover clustering*

- Planning a failover cluster
- Creating and configuring a new failover cluster
- Maintaining a failover cluster
- Troubleshooting a failover cluster
- Implementing site high availability with stretch clustering

*Implementing failover clustering with Windows Server 2016 Hyper-V*

- Overview of the integration of Hyper-V Server 2016 with failover clustering
- Implementing Hyper-V VMs on failover clusters
- Key features for VMs in a clustered environment

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB cluster
- Planning an NLB implementation

*Creating and managing deployment images*

- Introduction to deployment images
- Creating and managing deployment images by using MDT
- Virtual machine environments for different workloads

*Managing, monitoring, and maintaining virtual machine installations*

- WSUS overview and deployment options
- Update management process with WSUS
- Overview of Windows PowerShell DSC
- Overview of Windows Server 2016 monitoring tools
- Using Performance Monitor
- Monitoring event logs

## COURSE CDN110

Title: Networking with Windows Server 2016

Exam: Microsoft Exam 70-741

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the networking features and functionality available in Windows Server 2016. It covers DNS, DHCP, and IPAM implementations, in addition to remote access solutions, such as VPN and Direct Access. It also covers DFS and BranchCache solutions, high performance network features and functionality, and implementation of software-defined networking (SDN) solutions, such as Hyper-V Network Virtualization (HNV) and Network Controller.

### **Course Objectives**

This course will cover the following subjects:

#### *Planning and implementing an IPv4 network*

- Planning IPv4 addressing
- Configuring an IPv4 host
- Managing and troubleshooting IPv4 network connectivity

#### *Implementing DHCP*

- Overview of the DHCP server role
- Deploying DHCP
- Managing and troubleshooting DHCP

#### *Implementing IPv6*

- Overview of IPv6 addressing
- Configuring an IPv6 host
- Implementing IPv6 and IPv4 coexistence
- Transitioning from IPv4 to IPv6

#### *Implementing DNS*

- Implementing DNS servers
- Configuring zones in DNS
- Configuring name resolution between DNS zones
- Configuring DNS integration with Active Directory Domain Services (AD DS)
- Configuring advanced DNS settings

#### *Implementing and managing IPAM*

- Overview of IPAM
- Deploying IPAM
- Managing IP address spaces by using IPAM

#### *Remote access in Windows Server 2016*

- Overview of remote access
- Implementing the Web Application Proxy

#### *Implementing DirectAccess*

- Overview of DirectAccess
- Implementing DirectAccess by using the Getting Started Wizard
- Implementing and managing an advanced DirectAccess infrastructure

*Implementing VPNs*

- Planning VPNs
- Implementing VPNs

*Implementing networking for branch offices*

- Networking features and considerations for branch offices
- Implementing Distributed File System (DFS) for branch offices
- Implementing BranchCache for branch offices

*Configuring advanced networking features*

- Overview of high performance networking features
- Configuring advanced Microsoft Hyper-V networking features

*Implementing Software Defined Networking*

- Overview of SDN
- Implementing network virtualization
- Implementing Network Controller

## COURSE CDN120

Title: Identity with Windows Server 2016

Exam: Microsoft Exam 70-742

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the identity functionality in Windows Server 2016. It covers the installation and configuration of Active Directory Domain Services (AD DS), in addition to Group Policy implementation for non-Nano Server environments. It also covers functionality such as Active Directory Certificate Services (AD CS), Active Directory Federations Services (AD FS), and Web Application proxy implementations.

### **Course Objectives**

This course will cover the following subjects:

#### *Implementing Advanced Network Services*

- Configuring Advanced DHCP Features
- Configuring Advanced DNS Settings
- Implementing IPAM
- Managing IP Address Spaces with IPAM

#### *Implementing Advanced File Services*

- Configuring iSCSI Storage
- Configuring BranchCache
- Optimizing Storage Usage

#### *Implementing Dynamic Access Control*

- Overview of DAC
- Implementing DAC Components
- Implementing DAC for Access Control
- Implementing Access Denied Assistance
- Implementing and Managing Work Folders

#### *Implementing Distributed Active Directory Domain Services Deployments*

- Overview of Distributed AD DS Deployments
- Deploying a Distributed AD DS Environment
- Configuring AD DS Trusts

#### *Implementing Active Directory Domain Services Sites and Replication*

- AD DS Replication Overview
- Configuring AD DS Sites
- Configuring and Monitoring AD DS Replication

#### *Implementing AD CS*

- Using Certificates in a Business Environment
- PKI Overview
- Deploying CAs
- Deploying and Managing Certificate Templates
- Implementing Certificate Distribution and Revocation
- Managing Certificate Recovery



*Implementing Active Directory Rights Management Services*

- AD RMS Overview
- Deploying and Managing an AD RMS Infrastructure
- Configuring AD RMS Content Protection
- Configuring External Access to AD RMS

*Implementing and Administering AD FS*

- Overview of AD FS
- Deploying AD FS
- Implementing AD FS for a Single Organization
- Deploying AD FS in a Business-to-Business Federation Scenario
- Extending AD FS to External Clients

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB Cluster
- Planning an NLB Implementation

*Implementing Failover Clustering*

- Overview of Failover Clustering
- Implementing a Failover Cluster
- Configuring Highly Available Applications and Services on a Failover Cluster
- Maintaining a Failover Cluster
- Implementing a Multi-Site Failover Cluster

*Implementing Failover Clustering with Hyper-V*

- Overview of Integrating Hyper-V with Failover Clustering
- Implementing Hyper-V Virtual Machines on Failover Clusters
- Implementing Hyper-V Virtual Machine Movement

*Implementing Business Continuity and Disaster Recovery*

- Data Protection Overview
- Implementing Windows Server Backup
- Implementing Server and Data Recovery

## COURSE CDN130

Title: Developing Microsoft Azure Solutions

Exam: Microsoft Exam 70-532

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students the opportunity to take an existing web application and expand its functionality as part of moving it to Azure. The course does not require any existing experience with the ASP.NET platform but does require experience with C#. This course focuses on the development considerations and decisions necessary when building a highly available solution in the cloud.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of the Microsoft Azure Platform*

- Azure Services
- Azure Portal

#### *Building Application Infrastructure in Azure*

- Azure Virtual Machines
- Azure Virtual Machine Workloads
- Migrating Azure Virtual Machine Instances
- Highly Available Azure Virtual Machines
- Virtual Machine Configuration Management
- Customizing Azure Virtual Machine Networking
- Virtual Machine Scale Sets

#### *Hosting Web Applications on the Azure Platform*

- Azure Web Apps
- Azure Logic and Function Apps
- Configuring an App Service App
- Publishing an Azure App Service App
- Supplemental Services

#### *Storing SQL Data in Azure*

- Azure SQL Database Overview
- Managing SQL Databases in Azure
- Azure SQL Database Tools
- Securing and Recovering an Azure SQL Database Instance
- Additional Managed Database Services

#### *Designing Cloud Applications for Resiliency*

- Application Design Practices for Highly Available Applications
- Application Analytics
- Building High Performance Applications by Using ASP.NET
- Common Cloud Application Patterns
- Caching Application Data

#### *Storing Unstructured Data in Azure*

- Azure Storage Overview
- Azure Storage Tables
- Azure Redis Cache

- Azure Search
- Azure Cosmos DB

#### *Storing and Consuming Files from Azure Storage*

- Azure Storage Blobs
- Controlling Access to Storage Blobs and Containers
- Configuring Azure Storage Accounts
- Azure Files

#### *Designing a Communication Strategy by Using Queues and Service Bus*

- Azure Storage Queues
- Azure Service Bus
- Azure Service Bus Queues
- Azure Service Bus Relay
- Azure Service Bus Notification Hubs

#### *Automating Integration with Azure Resources*

- Creating Azure Scripts using Azure PowerShell
- Creating Azure Scripts using Azure CLI
- Azure Resource Manager
- Azure REST Interface
- Azure Cloud Shell

#### *DevOps in Azure*

- Continuous Integration
- Azure DevTest Labs
- Azure Resource Manager Templates
- Managed Solution Hosting

#### *Securing Azure Web Applications*

- Azure Active Directory
- Azure AD Directories
- Azure AD Offerings
- Azure Key Vault

## COURSE CDN140

Title: Implementing Microsoft Azure Infrastructure Solutions

Exam: Microsoft Exam 70-533

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises is for students who are experienced in implementing an infrastructure solution in Microsoft Azure. Students have experience implementing and monitoring cloud and hybrid solutions as well as supporting application lifecycle management. This course teaches IT professionals how to provision and manage services in Microsoft Azure. Students will learn how to implement infrastructure components such as virtual networks, virtual machines, containers, web and mobile apps, and storage in Azure. Students also will learn how to plan for and manage Azure AD, and configure Azure AD integration with on-premises Active Directory domains.

### **Course Objectives**

This course will cover the following subjects:

#### *Introduction to Azure*

- Cloud technology overview
- Overview of Azure
- Managing Azure with the Azure portal
- Managing Azure with Windows PowerShell
- Managing Azure with Azure CLI
- Overview of Azure deployment models
- Managing and monitoring Azure resources

#### *Implementing and managing Azure networking*

- Overview of Azure networking
- Implementing and managing virtual networks
- Configuring an Azure virtual network
- Configuring virtual network connectivity
- Overview of Azure classic networking

#### *Implementing virtual machines*

- Overview of Azure VMs
- Planning deployment of Azure VMs
- Deploying Azure VMs
- Overview of classic Azure VMs

#### *Managing Azure VMs*

- Configuring Azure VMs
- Managing disks of Azure VMs
- Managing and monitoring Azure VMs
- Managing classic Azure VMs

#### *Implementing Azure App Service*

- Introduction to App Service
- Planning app deployment in App Service
- Implementing and maintaining web apps
- Configuring web apps
- Monitoring web apps and WebJobs
- Implementing mobile apps

- Implementing Traffic Manager

*Planning and implementing storage, backup, and recovery services*

- Planning storage
- Implementing and managing Azure Storage
- Implementing Azure CDNs
- Implementing Azure Backup
- Planning and implementing Azure Site Recovery

*Implementing containers in Azure*

- Implementing Windows and Linux containers in Azure
- Implementing Azure Container Service

*Implementing Azure Cloud Services*

- Planning and deploying Azure Cloud Services
- Managing and maintaining Azure Cloud Services

*Implementing Azure Active Directory*

- Creating and managing Azure AD tenants
- Configuring application and resource access with Azure AD
- Overview of Azure AD Premium

*Managing an Active Directory infrastructure in a hybrid environment*

- Extending an on-premises Active Directory domain to Azure IaaS
- Implementing directory synchronization by using Azure AD Connect
- Implementing SSO in hybrid scenarios

*Implementing Azure-based management and automation*

- Implementing OMS
- Implementing Azure Automation
- Implementing Automation runbooks
- Implementing Azure Automation–based management

## COURSE CDN150

Title: Architecting Microsoft Azure Solutions

Exam: Microsoft Exam 70-535

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students skills to define the appropriate cloud native, cloud migration, and hybrid cloud solutions to meet the required functional, operational, and deployment requirements through the solution lifecycle. Students should know the features and capabilities of Azure services to be able to identify tradeoffs and make decisions for designing public and hybrid cloud solutions. Students should understand DevOps technologies, provisioning Azure resources using ARM templates, and designing highly resilient workloads running on Azure. This course is intended for architects who have experience building infrastructure and applications on the Microsoft Azure platform. Students should have a thorough understanding of most services offered on the Azure platform.

### **Course Objectives**

This course will cover the following subjects:

#### *Application Architecture Patterns in Azure*

- Pattern Resources
- Performance Patterns
- Resiliency Patterns
- Scalability Patterns
- Data Patterns

#### *Deploying Resources with Azure Resource Manager*

- ARM Templates
- Role-Based Access Control (RBAC)
- Resource Policies
- Security
- Building Blocks

#### *Building Azure IaaS-Based Server Applications*

- High Availability
- Templated Infrastructure
- Domain-Connected Machines

#### *Creating Managed Server Applications in Azure*

- Infrastructure-Backed Platform-as-a-Service (PaaS)
- High-Performance Compute (HPC)
- Migration

#### *Authoring Serverless Applications in Azure*

- Azure Web App
- Azure Functions
- Integration
- High Performance

#### *Backing Azure Solutions with Azure Storage*

- Pricing
- Blob Storage
- Files
- StorSimple

#### *Comparing Database Options in Azure*

- Relational
- NoSQL Services
- Azure Cosmos DB
- Data Storage
- Data Analysis

#### *Networking Azure Application Components*

- VNets
- Load Balancing
- External Connectivity
- Hybrid Connectivity

#### *Managing Security and Identity for Azure Solutions*

- Security Monitoring
- Data Security
- Application Security Azure Active Directory (Azure AD)
- Hybrid Identity
- Azure AD Application Integration

#### *Integrating SaaS Services Available on the Azure Platform*

- Cognitive Services
- Bot Services
- Machine Learning
- Media Services

#### *Integrating Azure Solution Components using Messaging Services*

- Event Messaging
- Integration
- IoT

#### *Monitoring and Automating Azure Solutions*

- Application Monitoring
- Platform Monitoring
- Network Monitoring
- Alerting
- Backup
- Azure Automation
- Config Management
- Auto-Scale

## COURSE CDN160

Title: Configuring and Operating a Hybrid Cloud with Microsoft Azure Stack

Exam: Microsoft Exam 70-537

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides the skills students need as Azure administrators and Azure Stack operators who use Azure Stack to provide cloud services to their end users or customers from within their own data center. Students for this course should have significant experience managing and operating Azure Stack environments. Students should have a strong understanding of Azure as well as some knowledge of virtualization, networking, and identity management. Students should also understand how Azure Stack enables DevOps processes and the hybrid development model. Students will learn the ability to plan, deploy, package, update, and maintain the Azure Stack infrastructure. Students will also learn the ability to offer hybrid cloud resources and requested services, and to manage infrastructure as a service (IaaS) and platform as a service (PaaS). This course is intended for service administrators, DevOps and cloud architects who are interested in using Microsoft Azure Stack to provide cloud services to their end-users or customers from within their own datacenter.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of Azure Stack*

- What is Azure Stack?
- Comparing Azure Stack with Microsoft Azure
- Comparing Azure Stack to Windows Azure Pack

#### *Foundational Components of Microsoft Azure Stack*

- Windows Server 2016 and System Center 2016
- Identity and Authentication

#### *Deploying Microsoft Azure Stack*

- Microsoft Azure Stack Architecture
- Azure Stack Prerequisites
- Installing Azure Stack

#### *Offering Microsoft Azure Stack Resources*

- Working with Plans and Offers
- Microsoft Azure Stack Marketplace
- Enabling Multi-Tenancy in Azure Stack
- Integrating Azure Stack with Windows Azure Pack

#### *Microsoft Azure Stack and DevOps*

- Technologies used in Microsoft Azure Stack for DevOps
- Azure Resource Manager Templates
- Third-party Resource Providers

#### *Infrastructure as a Service and Microsoft Azure Stack*

- Software Defined Networking improvements with Microsoft Azure Stack and Windows Server 2016
- Azure Stack Storage
- Virtual Machines in Microsoft Azure Stack



*Platform as a Service and Microsoft Azure Stack*

- Understanding the Platform as a Service.
- SQL Server and MySQL Server Providers in Microsoft Azure Stack.
- App Service Resource Provider.
- Azure Key Vault.
- Azure Functions.

## COURSE CDN170

Title: VMware vSphere: Install, Configure, and Manage (1)

Exam: 2V0-602

### *Virtualization Data Center*

- Introduce components of the virtualized data center
- Describe where vSphere fits into the cloud architecture
- Install and use vSphere Client

### *Creating Virtual Machines*

- Introduce virtual machines, virtual machine hardware, and virtual machine files
- Deploy a single virtual machine

### *VMware vCenter Server*

- Introduce the vCenter Server architecture
- Introduce VMware vCenter Single Sign-On
- Install and use vSphere Web Client
- Introduce VMware vCenter Server Appliance
- Configure and manage vCenter Server Appliance
- Manage vCenter Server inventory objects and licenses

### *Configuring and Managing Virtual Networks*

- Describe, create, and manage a standard switch
- Describe and modify standard switch properties
- Configure virtual switch load-balancing algorithms

### *Configuring and Managing Virtual Storage*

- Introduce storage protocols and device names
- Create and manage vSphere datastores
- Deploy and manage VMware Virtual SAN

### *Virtual Machine Management*

- Modify and manage virtual machines
- Create and manage virtual machine snapshots
- Create a VMware vSphere vApp

### *Access and Authentication Control*

- Control user access through roles and permissions
- Configure and manage the ESXi firewall
- Configure ESXi lockdown mode
- Integrate ESXi with Active Directory

### *Resource Management and Monitoring*

- Introduce virtual CPU and memory concepts
- Describe methods for optimizing CPU and memory usage
- Configure and manage resource pools
- Monitor resource usage using vCenter Server performance graphs and alarms

COURSE CDN180

Title: VMware vSphere: Install, Configure, and Manage (2)

Exam: 2V0-622

*High Availability and Fault Tolerance*

- Introduce the new vSphere High Availability architecture
- Configure and manage a vSphere HA cluster
- Introduce vSphere Fault Tolerance
- Describe VMware vSphere Replication

*Scalability*

- Configure and manage a VMware vSphere Distributed Resource Scheduler cluster
- Configure Enhanced vMotion Compatibility
- Use vSphere HA and DRS together

*Patch Management*

- Use vSphere Update Manager to manage ESXi patching
- Install vSphere Update Manager and the vSphere Update Manager plug-in
- Create patch baselines
- Scan and remediate hosts

*Installing VMware Components*

- Introduce ESXi installation
- Describe boot-from-SAN requirements
- Introduce vCenter Server deployment options
- Describe vCenter Server hardware, software, and database requirements
- Install vCenter Server (Windows-based)

## Certified LAN & WAN Specialist (CLWS)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is designed to provide students with the knowledge required for entry-level careers in computer networking, with an emphasis on Microsoft operating systems including Windows Vista and Windows Server 2012. Students will be guided through the features of the Microsoft operating systems will learn how implement, manage and maintain both workstations and servers in a Microsoft Windows networking environment. Additional topics include network infrastructure services that are required to support a Windows network including Active Directory, Name Resolution, TCP/IP and IP assignment, Windows Security, Remote Access, and Microsoft Exchange 2012.

This program also covers basic networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized.

This program will provide students with the skills and knowledge necessary to complete the Microsoft Certified System Engineer (MCSE) and Cisco Certified Network Associate (CCNA) certification exams.

- Certification program
- 624 Contact Hours, 39 Credit Hours, 78 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW100	Specialist I	3	48
CLW110	Specialist II	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW120	Specialist III	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 3

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW130	Specialist IV	3	48
CLW140	Specialist V	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 4**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW150	Specialist VI	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 5**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW160	Specialist VII	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 6**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW170	Specialist VIII	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 7**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CLW180	Specialist VIII	48	48
<b>Total</b>		<b>3</b>	<b>48</b>

**Prerequisites**

Candidates wishing to enter this course should have completed the A+ PC Hardware Technician coursework or have commensurate experience with PC hardware and basic operating system concepts.

**Type of Document Received Upon Graduation**

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

**Certification Tests**

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for midlevel professional opportunities in the IT field with emphasis on planning, installation, configuration and maintenance of client workstation and server operating system, applications and network infrastructure services using Microsoft technologies as well as internetworking components to support a Local Area Network (LAN) infrastructure. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Network Engineer, Network Support Specialist, Local Area Network Engineer, Network Systems Engineer, Server Administrator, Network Administrator, Windows Server Administrator or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1151 Computer User Support Specialist
- 15-1142 Network and Computer Systems Administrators
- 25-1021 Computer Science Teacher, Postsecondary

## CLWS Program Details

### COURSE CLW100

Title: Installation, Storage, and Compute with Windows Server 2016

Exam: Microsoft Exam 70-740

#### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses primarily on the installation, storage, and compute features and functionality available in Windows Server 2016. It covers general installation tasks and considerations and the installation and configuration of Nano Server, in addition to the creation and management of images for deployment. It also covers local and server storage solutions, including the configuration of disks and volumes, Data Deduplication, High Availability, Disaster Recovery, Storage Spaces Direct, and Failover Clustering solutions. This course also covers Hyper-V and containers, along with the maintenance and monitoring of servers in physical and compute environments.

#### **Course Objectives**

This course will cover the following subjects:

##### *Installing, upgrading, and migrating servers and workloads*

- Introducing Windows Server 2016
- Preparing and installing Server Core
- Preparing for upgrades and migrations
- Migrating server roles and workloads
- Windows Server activation models

##### *Configuring local storage*

- Managing disks in Windows Server
- Managing volumes in Windows Server

##### *Implementing enterprise storage solutions*

- Overview of DAS, NAS, and SANs
- Comparing Fibre Channel, iSCSI, and Fibre Channel over Ethernet
- Understanding iSNS, DCB, and MPIO
- Configuring sharing in Windows Server 2016

##### *Implementing Storage Spaces and Data Deduplication*

- Implementing Storage Spaces
- Managing Storage Spaces
- Implementing Data Deduplication

##### *Installing and configuring Hyper-V and virtual machines*

- Overview of Hyper-V
- Installing Hyper-V
- Configuring storage on Hyper-V host servers
- Configuring networking on Hyper-V host servers
- Configuring Hyper-V virtual machines
- Managing virtual machines

*Deploying and managing Windows and Hyper-V containers*

- Overview of containers in Windows Server 2016
- Deploying Windows Server and Hyper-V containers
- Installing, configuring, and managing containers by using Docker

*Overview of high availability and disaster recovery*

- Defining levels of availability
- Planning high availability and disaster recovery solutions with Hyper-V virtual machines
- Backing up and restoring by using Windows Server Backup
- High availability with failover clustering in Windows Server 2016

*Implementing failover clustering*

- Planning a failover cluster
- Creating and configuring a new failover cluster
- Maintaining a failover cluster
- Troubleshooting a failover cluster
- Implementing site high availability with stretch clustering

*Implementing failover clustering with Windows Server 2016 Hyper-V*

- Overview of the integration of Hyper-V Server 2016 with failover clustering
- Implementing Hyper-V VMs on failover clusters
- Key features for VMs in a clustered environment

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB cluster
- Planning an NLB implementation

*Creating and managing deployment images*

- Introduction to deployment images
- Creating and managing deployment images by using MDT
- Virtual machine environments for different workloads

*Managing, monitoring, and maintaining virtual machine installations*

- WSUS overview and deployment options
- Update management process with WSUS
- Overview of Windows PowerShell DSC
- Overview of Windows Server 2016 monitoring tools
- Using Performance Monitor
- Monitoring event logs



## COURSE CLW110

Title: Networking with Windows Server 2016

Exam: Microsoft Exam 70-741

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the networking features and functionality available in Windows Server 2016. It covers DNS, DHCP, and IPAM implementations, in addition to remote access solutions, such as VPN and Direct Access. It also covers DFS and BranchCache solutions, high performance network features and functionality, and implementation of software-defined networking (SDN) solutions, such as Hyper-V Network Virtualization (HNV) and Network Controller.

### **Course Objectives**

This course will cover the following subjects:

#### *Planning and implementing an IPv4 network*

- Planning IPv4 addressing
- Configuring an IPv4 host
- Managing and troubleshooting IPv4 network connectivity

#### *Implementing DHCP*

- Overview of the DHCP server role
- Deploying DHCP
- Managing and troubleshooting DHCP

#### *Implementing IPv6*

- Overview of IPv6 addressing
- Configuring an IPv6 host
- Implementing IPv6 and IPv4 coexistence
- Transitioning from IPv4 to IPv6

#### *Implementing DNS*

- Implementing DNS servers
- Configuring zones in DNS
- Configuring name resolution between DNS zones
- Configuring DNS integration with Active Directory Domain Services (AD DS)
- Configuring advanced DNS settings

#### *Implementing and managing IPAM*

- Overview of IPAM
- Deploying IPAM
- Managing IP address spaces by using IPAM

#### *Remote access in Windows Server 2016*

- Overview of remote access
- Implementing the Web Application Proxy

#### *Implementing DirectAccess*

- Overview of DirectAccess
- Implementing DirectAccess by using the Getting Started Wizard
- Implementing and managing an advanced DirectAccess infrastructure

*Implementing VPNs*

- Planning VPNs
- Implementing VPNs

*Implementing networking for branch offices*

- Networking features and considerations for branch offices
- Implementing Distributed File System (DFS) for branch offices
- Implementing BranchCache for branch offices

*Configuring advanced networking features*

- Overview of high performance networking features
- Configuring advanced Microsoft Hyper-V networking features

*Implementing Software Defined Networking*

- Overview of SDN
- Implementing network virtualization
- Implementing Network Controller

## COURSE CLW120

Title: Identity with Windows Server 2016

Exam: Microsoft Exam 70-742

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises focuses on the identity functionality in Windows Server 2016. It covers the installation and configuration of Active Directory Domain Services (AD DS), in addition to Group Policy implementation for non-Nano Server environments. It also covers functionality such as Active Directory Certificate Services (AD CS), Active Directory Federations Services (AD FS), and Web Application proxy implementations.

### **Course Objectives**

This course will cover the following subjects:

#### *Implementing Advanced Network Services*

- Configuring Advanced DHCP Features
- Configuring Advanced DNS Settings
- Implementing IPAM
- Managing IP Address Spaces with IPAM

#### *Implementing Advanced File Services*

- Configuring iSCSI Storage
- Configuring BranchCache
- Optimizing Storage Usage

#### *Implementing Dynamic Access Control*

- Overview of DAC
- Implementing DAC Components
- Implementing DAC for Access Control
- Implementing Access Denied Assistance
- Implementing and Managing Work Folders

#### *Implementing Distributed Active Directory Domain Services Deployments*

- Overview of Distributed AD DS Deployments
- Deploying a Distributed AD DS Environment
- Configuring AD DS Trusts

#### *Implementing Active Directory Domain Services Sites and Replication*

- AD DS Replication Overview
- Configuring AD DS Sites
- Configuring and Monitoring AD DS Replication

#### *Implementing AD CS*

- Using Certificates in a Business Environment
- PKI Overview
- Deploying CAs
- Deploying and Managing Certificate Templates
- Implementing Certificate Distribution and Revocation
- Managing Certificate Recovery

*Implementing Active Directory Rights Management Services*

- AD RMS Overview
- Deploying and Managing an AD RMS Infrastructure
- Configuring AD RMS Content Protection
- Configuring External Access to AD RMS

*Implementing and Administering AD FS*

- Overview of AD FS
- Deploying AD FS
- Implementing AD FS for a Single Organization
- Deploying AD FS in a Business-to-Business Federation Scenario
- Extending AD FS to External Clients

*Implementing Network Load Balancing*

- Overview of NLB
- Configuring an NLB Cluster
- Planning an NLB Implementation

*Implementing Failover Clustering*

- Overview of Failover Clustering
- Implementing a Failover Cluster
- Configuring Highly Available Applications and Services on a Failover Cluster
- Maintaining a Failover Cluster
- Implementing a Multi-Site Failover Cluster

*Implementing Failover Clustering with Hyper-V*

- Overview of Integrating Hyper-V with Failover Clustering
- Implementing Hyper-V Virtual Machines on Failover Clusters
- Implementing Hyper-V Virtual Machine Movement

*Implementing Business Continuity and Disaster Recovery*

- Data Protection Overview
- Implementing Windows Server Backup
- Implementing Server and Data Recovery

## COURSE CLW130

Title: Developing Microsoft Azure Solutions

Exam: Microsoft Exam 70-532

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students the opportunity to take an existing web application and expand its functionality as part of moving it to Azure. The course does not require any existing experience with the ASP.NET platform but does require experience with C#. This course focuses on the development considerations and decisions necessary when building a highly available solution in the cloud.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of the Microsoft Azure Platform*

- Azure Services
- Azure Portal

#### *Building Application Infrastructure in Azure*

- Azure Virtual Machines
- Azure Virtual Machine Workloads
- Migrating Azure Virtual Machine Instances
- Highly Available Azure Virtual Machines
- Virtual Machine Configuration Management
- Customizing Azure Virtual Machine Networking
- Virtual Machine Scale Sets

#### *Hosting Web Applications on the Azure Platform*

- Azure Web Apps
- Azure Logic and Function Apps
- Configuring an App Service App
- Publishing an Azure App Service App
- Supplemental Services

#### *Storing SQL Data in Azure*

- Azure SQL Database Overview
- Managing SQL Databases in Azure
- Azure SQL Database Tools
- Securing and Recovering an Azure SQL Database Instance
- Additional Managed Database Services

#### *Designing Cloud Applications for Resiliency*

- Application Design Practices for Highly Available Applications
- Application Analytics
- Building High Performance Applications by Using ASP.NET
- Common Cloud Application Patterns
- Caching Application Data

#### *Storing Unstructured Data in Azure*

- Azure Storage Overview
- Azure Storage Tables
- Azure Redis Cache

- Azure Search
- Azure Cosmos DB

#### *Storing and Consuming Files from Azure Storage*

- Azure Storage Blobs
- Controlling Access to Storage Blobs and Containers
- Configuring Azure Storage Accounts
- Azure Files

#### *Designing a Communication Strategy by Using Queues and Service Bus*

- Azure Storage Queues
- Azure Service Bus
- Azure Service Bus Queues
- Azure Service Bus Relay
- Azure Service Bus Notification Hubs

#### *Automating Integration with Azure Resources*

- Creating Azure Scripts using Azure PowerShell
- Creating Azure Scripts using Azure CLI
- Azure Resource Manager
- Azure REST Interface
- Azure Cloud Shell

#### *DevOps in Azure*

- Continuous Integration
- Azure DevTest Labs
- Azure Resource Manager Templates
- Managed Solution Hosting

#### *Securing Azure Web Applications*

- Azure Active Directory
- Azure AD Directories
- Azure AD Offerings
- Azure Key Vault

## COURSE CLW140

Title: Implementing Microsoft Azure Infrastructure Solutions

Exam: Microsoft Exam 70-533

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises is for students who are experienced in implementing an infrastructure solution in Microsoft Azure. Students have experience implementing and monitoring cloud and hybrid solutions as well as supporting application lifecycle management. This course teaches IT professionals how to provision and manage services in Microsoft Azure. Students will learn how to implement infrastructure components such as virtual networks, virtual machines, containers, web and mobile apps, and storage in Azure. Students also will learn how to plan for and manage Azure AD, and configure Azure AD integration with on-premises Active Directory domains.

### **Course Objectives**

This course will cover the following subjects:

#### *Introduction to Azure*

- Cloud technology overview
- Overview of Azure
- Managing Azure with the Azure portal
- Managing Azure with Windows PowerShell
- Managing Azure with Azure CLI
- Overview of Azure deployment models
- Managing and monitoring Azure resources

#### *Implementing and managing Azure networking*

- Overview of Azure networking
- Implementing and managing virtual networks
- Configuring an Azure virtual network
- Configuring virtual network connectivity
- Overview of Azure classic networking

#### *Implementing virtual machines*

- Overview of Azure VMs
- Planning deployment of Azure VMs
- Deploying Azure VMs
- Overview of classic Azure VMs

#### *Managing Azure VMs*

- Configuring Azure VMs
- Managing disks of Azure VMs
- Managing and monitoring Azure VMs
- Managing classic Azure VMs

#### *Implementing Azure App Service*

- Introduction to App Service
- Planning app deployment in App Service
- Implementing and maintaining web apps
- Configuring web apps
- Monitoring web apps and WebJobs
- Implementing mobile apps

- Implementing Traffic Manager

*Planning and implementing storage, backup, and recovery services*

- Planning storage
- Implementing and managing Azure Storage
- Implementing Azure CDNs
- Implementing Azure Backup
- Planning and implementing Azure Site Recovery

*Implementing containers in Azure*

- Implementing Windows and Linux containers in Azure
- Implementing Azure Container Service

*Implementing Azure Cloud Services*

- Planning and deploying Azure Cloud Services
- Managing and maintaining Azure Cloud Services

*Implementing Azure Active Directory*

- Creating and managing Azure AD tenants
- Configuring application and resource access with Azure AD
- Overview of Azure AD Premium

*Managing an Active Directory infrastructure in a hybrid environment*

- Extending an on-premises Active Directory domain to Azure IaaS
- Implementing directory synchronization by using Azure AD Connect
- Implementing SSO in hybrid scenarios

*Implementing Azure-based management and automation*

- Implementing OMS
- Implementing Azure Automation
- Implementing Automation runbooks
- Implementing Azure Automation-based management



## COURSE CLW150

Title: Architecting Microsoft Azure Solutions

Exam: Microsoft Exam 70-535

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides students skills to define the appropriate cloud native, cloud migration, and hybrid cloud solutions to meet the required functional, operational, and deployment requirements through the solution lifecycle. Students should know the features and capabilities of Azure services to be able to identify tradeoffs and make decisions for designing public and hybrid cloud solutions. Students should understand DevOps technologies, provisioning Azure resources using ARM templates, and designing highly resilient workloads running on Azure. This course is intended for architects who have experience building infrastructure and applications on the Microsoft Azure platform. Students should have a thorough understanding of most services offered on the Azure platform.

### **Course Objectives**

This course will cover the following subjects:

#### *Application Architecture Patterns in Azure*

- Pattern Resources
- Performance Patterns
- Resiliency Patterns
- Scalability Patterns
- Data Patterns

#### *Deploying Resources with Azure Resource Manager*

- ARM Templates
- Role-Based Access Control (RBAC)
- Resource Policies
- Security
- Building Blocks

#### *Building Azure IaaS-Based Server Applications*

- High Availability
- Templated Infrastructure
- Domain-Connected Machines

#### *Creating Managed Server Applications in Azure*

- Infrastructure-Backed Platform-as-a-Service (PaaS)
- High-Performance Compute (HPC)
- Migration

#### *Authoring Serverless Applications in Azure*

- Azure Web App
- Azure Functions
- Integration
- High Performance

#### *Backing Azure Solutions with Azure Storage*

- Pricing
- Blob Storage
- Files
- StorSimple

#### *Comparing Database Options in Azure*

- Relational
- NoSQL Services
- Azure Cosmos DB
- Data Storage
- Data Analysis

#### *Networking Azure Application Components*

- VNets
- Load Balancing
- External Connectivity
- Hybrid Connectivity

#### *Managing Security and Identity for Azure Solutions*

- Security Monitoring
- Data Security
- Application Security Azure Active Directory (Azure AD)
- Hybrid Identity
- Azure AD Application Integration

#### *Integrating SaaS Services Available on the Azure Platform*

- Cognitive Services
- Bot Services
- Machine Learning
- Media Services

#### *Integrating Azure Solution Components using Messaging Services*

- Event Messaging
- Integration
- IoT

#### *Monitoring and Automating Azure Solutions*

- Application Monitoring
- Platform Monitoring
- Network Monitoring
- Alerting
- Backup
- Azure Automation
- Config Management
- Auto-Scale

## COURSE CLW160

Title: Configuring and Operating a Hybrid Cloud with Microsoft Azure Stack

Exam: Microsoft Exam 70-537

### **Course Description**

This instructor-led course with a combination of lecture and hands-on laboratory exercises provides the skills students need as Azure administrators and Azure Stack operators who use Azure Stack to provide cloud services to their end users or customers from within their own data center. Students for this course should have significant experience managing and operating Azure Stack environments. Students should have a strong understanding of Azure as well as some knowledge of virtualization, networking, and identity management. Students should also understand how Azure Stack enables DevOps processes and the hybrid development model. Students will learn the ability to plan, deploy, package, update, and maintain the Azure Stack infrastructure. Students will also learn the ability to offer hybrid cloud resources and requested services, and to manage infrastructure as a service (IaaS) and platform as a service (PaaS). This course is intended for service administrators, DevOps and cloud architects who are interested in using Microsoft Azure Stack to provide cloud services to their end-users or customers from within their own datacenter.

### **Course Objectives**

This course will cover the following subjects:

#### *Overview of Azure Stack*

- What is Azure Stack?
- Comparing Azure Stack with Microsoft Azure
- Comparing Azure Stack to Windows Azure Pack

#### *Foundational Components of Microsoft Azure Stack*

- Windows Server 2016 and System Center 2016
- Identity and Authentication

#### *Deploying Microsoft Azure Stack*

- Microsoft Azure Stack Architecture
- Azure Stack Prerequisites
- Installing Azure Stack

#### *Offering Microsoft Azure Stack Resources*

- Working with Plans and Offers
- Microsoft Azure Stack Marketplace
- Enabling Multi-Tenancy in Azure Stack
- Integrating Azure Stack with Windows Azure Pack

#### *Microsoft Azure Stack and DevOps*

- Technologies used in Microsoft Azure Stack for DevOps
- Azure Resource Manager Templates
- Third-party Resource Providers

#### *Infrastructure as a Service and Microsoft Azure Stack*

- Software Defined Networking improvements with Microsoft Azure Stack and Windows Server 2016
- Azure Stack Storage
- Virtual Machines in Microsoft Azure Stack

*Platform as a Service and Microsoft Azure Stack*

- Understanding the Platform as a Service.
- SQL Server and MySQL Server Providers in Microsoft Azure Stack.
- App Service Resource Provider.
- Azure Key Vault.
- Azure Functions.

## COURSE CLW170

Title: Cisco Certified Network Associate

Exam: 100-105

### **Course Objectives**

This course will cover the following subjects:

#### *Operation of IP Data Networks*

- Recognize the purpose and functions of various network devices such as Routers, Switches, Bridges and Hubs<sup>[SEP]</sup>
- Select the components required to meet a given network specification<sup>[SEP]</sup>
- Identify common applications and their impact on the network<sup>[SEP]</sup>
- Describe the purpose and basic operation of the protocols in<sup>[SEP]</sup>the OSI and TCP/IP models<sup>[SEP]</sup>
- Predict the data flow between two hosts across a network<sup>[SEP]</sup>
- Identify the appropriate media, cables, ports, and connectors<sup>[SEP]</sup>to connect Cisco network devices to other network devices and hosts in a LAN

#### *LAN Switching Technologies*

- Determine the technology and media access control method for Ethernet networks<sup>[SEP]</sup>
- Identify basic switching concepts and the operation of Cisco switches
- Configure and verify initial switch configuration including remote access management
- Verify network status and switch operation using basic utilities
- Describe how VLANs create logically separate networks and the need for routing between them
- Configure and verify VLANs<sup>[SEP]</sup>
- Configure and verify trunking on Cisco switches
- Identify enhanced switching technologies
- Configure and verify PVSTP operation

#### *IP Addressing*

- Describe the operation and necessity of using private and public IP addresses for IPv4 addressing<sup>[SEP]</sup>
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Identify the appropriate IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Describe the technological requirements for running IPv6 in conjunction with IPv4
- Describe IPv6 addresses

#### *IP Routing Technologies*

- Describe basic routing concepts
- Configure and verify utilizing the CLI to set basic router configuration
- Configure and verify operation status of a device interface
- Verify router configuration and network connectivity using
- Configure and verify routing configuration for a static or default route given specific routing requirements<sup>[SEP]</sup>
- Differentiate methods of routing and routing protocols
- Configure and verify OSPF
- Configure and verify interVLAN routing (Router on a stick)
- Configure SVI interfaces<sup>[SEP]</sup>
- Manage Cisco IOS Files
- Configure and verify EIGRP (single AS)

## COURSE CLW180

Title: Cisco Certified Network Associate

Exam: 200-105

### **Course Objectives**

This course will cover the following subjects:

#### *IP Services*

- Configure and verify DHCP (IOS Router)
- Describe the types, features, and applications of ACLs
- Configure and verify ACLs in a network environment
- Identify the basic operation of NAT
- Configure and verify NAT for given network requirements<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify NTP as a client<sup>[1][1]</sup><sub>[SEP]</sub>
- Recognize High availability (FHRP)
- Configure and verify syslog
- Describe SNMP v2 and v3

#### *Network Device Security*

- Configure and verify network device security features
- Configure and verify switch port security
- Configure and verify ACLs to filter network traffic<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify an ACLs to limit telnet and SSH access to the router

#### *Troubleshooting*

- Troubleshoot and correct common problems associated with IP addressing and host configurations<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve VLAN problems
- Troubleshoot and resolve trunking problems on Cisco switches
- Troubleshoot and resolve ACL issues
- Troubleshoot and resolve Layer 1 problems
- Identify and correct common network problems<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve spanning tree operation issues
- Troubleshoot and resolve routing issues
- Troubleshoot and resolve OSPF problems
- Troubleshoot and resolve EIGRP problems
- Troubleshoot and resolve interVLAN routing problems
- Troubleshoot and resolve WAN implementation issues
- Monitor NetFlow statistics<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot EtherChannel problems

#### *WAN Technologies*

- Identify different WAN Technologies
- Configure and verify a basic WAN serial connection<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify a PPP connection between Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify frame relay on Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Implement and troubleshoot PPPoE

## Cisco Certified Network Expert (CCNE)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized.

This program is also designed to build advanced or journeyman knowledge of both LAN and WAN infrastructure implementations in a Cisco environment. This set of courses builds on the concepts introduced in the CCNA program. Students will be exposed to more in-depth concepts relating to routing implementation and design; TCP/IP design strategies; switching concepts; WAN optimization and performance issues; as well as, basic troubleshooting/support techniques and approaches. Some of the many protocols that will be studied include: TCP/IP, RIP, EIGRP, OSPF, IS-IS, BGP. Other topics include: VLAN implementation and management; spanning-tree protocol; multicast management; remote access implementation; Cisco security features including AAA; subnet concepts, design considerations, and implementation; VLSM; CIDR and more.

In addition, this program covers advanced topics and concepts related to securing Cisco networks. This course covers a wide array of security topics including: Cisco IOS firewall implementation; PIX firewall technology and features; VPN concepts and implementation; IPSec; implementation and design of intrusion detection systems; Cisco's SAFE implementation; AAA; protocol monitoring and management and much more. The goal of this course is to give the student the tools and knowledge necessary to secure and manage complex network infrastructures – protecting data and productivity, as well as, reducing costs.

This program provides the skills and knowledge necessary to pass the Cisco certifications including Cisco Certified Network Associate (CCNA), Cisco Certified Network Professional (CCNP Route & Switch), and Cisco Certified Security Professional (CCNP Security).

- Certification program
- 624 Contact Hours, 39 Credit Hours, 78 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE100	Expert I	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE110	Expert II	3	48
CCE120	Expert III	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 3**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE130	Expert IV	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 4**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE140	Expert V	3	48
CCE150	Expert VI	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 5**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CSP160	Expert VII	3	48
CCE170	Expert VIII	3	48
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 6**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE180	Expert IX	6	96
<b>Total</b>		<b>6</b>	<b>96</b>

**TERM 7**

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CCE190	Expert X	3	48
<b>Total</b>		<b>3</b>	<b>48</b>

**Prerequisites**

Candidates wishing to enter this course should have completed either a Microsoft or Linux+ networking program or have commensurate experience with PC networking and TCP/IP.

**Type of Document Received Upon Graduation**

Upon successful completion of all program requirements, each student will be awarded a Certificate of Completion.

**Certification Tests**

All certification exams are scored on a pass/fail basis. Depending on the specific exam, a correct response to 75% - 80% of the questions will be required to achieve a passing score. Students are encouraged to take exams immediately following completion of the corresponding course.



**Career Development**

Students who successfully complete this program will be prepared for midlevel to advanced professional opportunities in the IT field with emphasis on installation, configuration and maintenance of Local Area Network (LAN) and Wide Area Network (WAN) infrastructure. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Sr. Network Design Engineer, Sr. Network Security Engineer, Sr. Network Design Specialist, Sr. Network Systems Manager, Network Support or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 15-1143 Computer Network Architects
- 25-1021 Computer Science Teacher, Postsecondary
- 11-3021 Computer & Information System Manager

## CCNE Program Details

### COURSE CCE100

Title: Cisco Certified Network Associate

Exam: 200-125

#### Course Description

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers basic networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized. This is an advanced course providing the skills and knowledge necessary to pass the Cisco certification exam (one exam) necessary to become a Cisco Certified Network Associate (CCNA).

#### Course Objectives

This course will cover the following subjects:

##### *Operation of IP Data Networks*

- Recognize the purpose and functions of various network devices such as Routers, Switches, Bridges and Hubs<sup>[SEP]</sup>
- Select the components required to meet a given network specification<sup>[SEP]</sup>
- Identify common applications and their impact on the network<sup>[SEP]</sup>
- Describe the purpose and basic operation of the protocols in<sup>[SEP]</sup>the OSI and TCP/IP models<sup>[SEP]</sup>
- Predict the data flow between two hosts across a network<sup>[SEP]</sup>
- Identify the appropriate media, cables, ports, and connectors<sup>[SEP]</sup>to connect Cisco network devices to other network devices and hosts in a LAN

##### *LAN Switching Technologies*

- Determine the technology and media access control method for Ethernet networks<sup>[SEP]</sup>
- Identify basic switching concepts and the operation of Cisco switches
- Configure and verify initial switch configuration including remote access management
- Verify network status and switch operation using basic utilities
- Describe how VLANs create logically separate networks and the need for routing between them
- Configure and verify VLANs<sup>[SEP]</sup>
- Configure and verify trunking on Cisco switches
- Identify enhanced switching technologies
- Configure and verify PVSTP operation

##### *IP Addressing*

- Describe the operation and necessity of using private and public IP addresses for IPv4 addressing<sup>[SEP]</sup>
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Identify the appropriate IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment<sup>[SEP]</sup>
- Describe the technological requirements for running IPv6 in conjunction with IPv4
- Describe IPv6 addresses

##### *IP Routing Technologies*

- Describe basic routing concepts
- Configure and verify utilizing the CLI to set basic router configuration

- Configure and verify operation status of a device interface
- Verify router configuration and network connectivity using
- Configure and verify routing configuration for a static or default route given specific routing requirements<sup>[1][1]</sup><sub>[SEP]</sub>
- Differentiate methods of routing and routing protocols
- Configure and verify OSPF
- Configure and verify interVLAN routing (Router on a stick)
- Configure SVI interfaces<sup>[1][1]</sup><sub>[SEP]</sub>
- Manage Cisco IOS Files
- Configure and verify EIGRP (single AS)

#### *IP Services*

- Configure and verify DHCP (IOS Router)
- Describe the types, features, and applications of ACLs
- Configure and verify ACLs in a network environment
- Identify the basic operation of NAT
- Configure and verify NAT for given network requirements<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify NTP as a client<sup>[1][1]</sup><sub>[SEP]</sub>
- Recognize High availability (FHRP)
- Configure and verify syslog
- Describe SNMP v2 and v3

#### *Network Device Security*

- Configure and verify network device security features
- Configure and verify switch port security
- Configure and verify ACLs to filter network traffic<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify an ACLs to limit telnet and SSH access to the router

#### *Troubleshooting*

- Troubleshoot and correct common problems associated with IP addressing and host configurations<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve VLAN problems
- Troubleshoot and resolve trunking problems on Cisco switches
- Troubleshoot and resolve ACL issues
- Troubleshoot and resolve Layer 1 problems
- Identify and correct common network problems<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot and resolve spanning tree operation issues
- Troubleshoot and resolve routing issues
- Troubleshoot and resolve OSPF problems
- Troubleshoot and resolve EIGRP problems
- Troubleshoot and resolve interVLAN routing problems
- Troubleshoot and resolve WAN implementation issues
- Monitor NetFlow statistics<sup>[1][1]</sup><sub>[SEP]</sub>
- Troubleshoot EtherChannel problems

#### *WAN Technologies*

- Identify different WAN Technologies
- Configure and verify a basic WAN serial connection<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify a PPP connection between Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Configure and verify frame relay on Cisco routers<sup>[1][1]</sup><sub>[SEP]</sub>
- Implement and troubleshoot PPPoE

## COURSE CCE110

Title: Implementing Cisco IP Routing

Exam: 300-101

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to use advanced IP addressing and routing in implementing scalability for Cisco ISR routers connected to LANs and WANs. The exam covers topics on Advanced IP Addressing, Routing Principles, Multicast Routing, IPv6, Manipulating Routing Updates, Configuring basic BGP, Configuring EIGRP, OSPF, and IS-IS.

### **Course Objectives**

This course will cover the following subjects:

- Identify Cisco Express Forwarding Concepts
- Explain General Network Challenges
- Describe IP Operations
- Explain TCP Operations
- Describe UDP Operations
- Recognize Proposed Changes to the Network
- Configure and Verify PPP
- Explain Frame Relay
- Identify, Configure, and Verify IPv4 addressing and subnetting
- Identify IPv6 Addressing and Subnetting
- Configure and Verify Static Routing
- Configure and Verify Default Routing
- Evaluate Routing Protocol Types
- Configure and Verify GRE
- Describe DMVPN
- Describe Easy Virtual Networking
- Describe IOS AAA Using Local Database
- Describe Device Security Using IOS AAA with TACACS+ and RADIUS
- Configure and Verify Device Access Control
- Configure and Verify Router Security Features
- Configure and Verify Device Management
- Configure and Verify SNMP
- Configure and Verify Logging
- Configure and Verify Network Time Protocol
- Configure and Verify IPv4 and IPv6 DHCP
- Configure and Verify IPv4 Network Address Translation
- Describe IPv6 NAT
- Describe SLA Architecture
- Configure and Verify IP SLA
- Configure and Verify Tracking Objects
- Configure and Verify Cisco NetFlow

## COURSE CCE120

Title: Implementing Cisco Switched Networks

Exam: 300-115

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to implement scalable multilayer switched networks. The exam includes topics on Campus Networks, describing and implementing advanced Spanning Tree concepts, VLANs and Inter-VLAN routing, High Availability, Wireless Client Access, Access Layer Voice concepts, and minimizing service Loss and Data Theft in a Campus Network.

### **Course Objectives**

This course will cover the following subjects:

- Configure and Verify Switch Administration
- Configure and Verify Layer 2 Protocols
- Configure and Verify VLANs
- Configure and Verify Trunking
- Configure and Verify EtherChannels
- Configure and Verify Spanning Tree
- Configure and Verify Other LAN Switching Technologies
- Describe Chassis Virtualization and Aggregation Technologies
- Configure and Verify Switch Security Features
- Describe Device Security Using Cisco IOS AA with TACACS+ and RADIUS
- Configure and Verify First-Hop Redundancy Protocols

## COURSE CCE130

Title: Troubleshooting and Maintaining Cisco IP Networks

Exam: 300-135

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to secure and expand the reach of an enterprise network to (1) plan and perform regular maintenance on complex enterprise routed and switched networks and (2) use technology-based practices and a systematic ITIL-compliant approach to perform network troubleshooting.

### **Course Objectives**

This course will cover the following subjects:

- Use Cisco IOS Troubleshooting Tools
- Apply Troubleshooting methodologies
- Troubleshoot Switch Administration
- Troubleshoot Layer 2 Protocols
- Troubleshoot VLANs
- Troubleshoot Trunking
- Troubleshoot EtherChannels
- Troubleshoot Spanning Tree
- Troubleshoot other LAN Switching Technologies
- Troubleshoot Chassis Virtualization and Aggregation Technologies
- Troubleshoot IPv4 Addressing and Subnetting
- Troubleshoot IPv6 Addressing and Subnetting
- Troubleshoot Static Routing
- Troubleshoot Default Routing
- Troubleshoot Administrative Distance
- Troubleshoot GRE
- Troubleshoot IOS AAA using Local Database
- Troubleshoot Device Access Control
- Troubleshoot Router Security Features
- Troubleshoot Device Management
- Troubleshoot SNMP
- Troubleshoot Logging
- Troubleshoot Network Time Protocol
- Troubleshoot IPv4 and IPv6 DHCP
- Troubleshoot IPv4 Network Address Translation
- Troubleshoot SLA Architecture
- Troubleshoot Tracking Objects

## COURSE CCE140

Title: Implementing Cisco IOS Network Security

Exam: 210-260

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the CCNA Security certification. This exam tests a candidate's knowledge of securing Cisco routers and switches and their associated networks. It leads to validated skills for installation, troubleshooting and monitoring of network devices to maintain integrity, confidentiality and availability of data and devices and develops competency in the technologies that Cisco uses in its security infrastructure.

### **Course Objectives**

This course will cover the following subjects:

#### *Security Concepts*

- Common security principles
- Describe confidentiality, integrity, availability (CIA)
- Describe SIEM technology
- Identify common security terms
- Identify common network security zones
- Common security threats
- Identify common network attacks
- Describe social engineering
- Identify malware
- Classify the vectors of data loss/exfiltration
- Cryptography concepts
- Describe key exchange
- Describe hash algorithm
- Compare and contrast symmetric and asymmetric encryption
- Describe digital signatures, certificates, and PKI
- Describe network topologies
- Campus area network (CAN)
- Cloud, wide area network (WAN)
- Data center
- Small office/home office (SOHO)
- Network security for a virtual environment

#### *Secure Access*

- Secure management
- Compare in-band and out-of band
- Configure secure network management
- Configure and verify secure access through SNMP v3 using an ACL
- Configure and verify security for NTP
- Use SCP for file transfer
- AAA concepts
- Describe RADIUS and TACACS+ technologies
- Configure administrative access on a Cisco router using TACACS+
- Verify connectivity on a Cisco router to a TACACS+ server
- Explain the integration of Active Directory with AAA
- Describe authentication and authorization using ACS and ISE
- 802.1X authentication

- Identify the functions 802.1X components
- BYOD
- Describe the BYOD architecture framework
- Describe the function of mobile device management (MDM)

#### *VPN*

- VPN concepts
- Describe IPsec protocols and delivery modes (IKE, ESP, AH, tunnel mode, transport mode)
- Describe hairpinning, split tunneling, always-on, NAT traversal
- Remote access VPN
- Implement basic clientless SSL VPN using ASDM
- Verify clientless connection
- Implement basic AnyConnect SSL VPN using ASDM
- Verify AnyConnect connection
- Identify endpoint posture assessment
- Site-to-site VPN
- Implement an IPsec site-to-site VPN with pre-shared key authentication on Cisco routers and ASA firewalls
- Verify an IPsec site-to-site VPN

#### *Secure Routing and Switching*

- Security on Cisco routers
- Configure multiple privilege levels
- Configure Cisco IOS role-based CLI access
- Implement Cisco IOS resilient configuration
- Securing routing protocols
- Implement routing update authentication on OSPF
- Securing the control plane
- Explain the function of control plane policing
- Common Layer 2 attacks
- Describe STP attacks
- Describe ARP spoofing
- Describe MAC spoofing
- Describe CAM table (MAC address table) overflows
- Describe CDP/LLDP reconnaissance
- Describe VLAN hopping
- Describe DHCP spoofing
- Mitigation procedures
- Implement DHCP snooping
- Implement Dynamic ARP Inspection
- Implement port security
- Describe BPDU guard, root guard, loop guard
- Verify mitigation procedures
- VLAN security
- Describe the security implications of a PVLAN
- Describe the security implications of a native VLAN

#### *Cisco Firewall Technologies*

- Describe operational strengths and weaknesses of the different firewall technologies
- a Proxy firewalls
- Application firewall
- Personal firewall
- Compare stateful vs. stateless firewalls



- Operations
- Function of the state table
- Implement NAT on Cisco ASA 9.x
- Static
- Dynamic
- PAT
- Policy NAT
- Verify NAT operations
- Implement zone-based firewall
- Zone to zone
- Self Zone
- Firewall features on the Cisco Adaptive Security Appliance (ASA) 9.x
- Configure ASA access management
- Configure security access policies
- Configure Cisco ASA interface security levels
- Configure default Cisco Modular Policy Framework (MPF)
- Describe modes of deployment (routed firewall, transparent firewall)
- Describe methods of implementing high availability
- Describe security contexts
- Describe firewall services

#### *IPS*

- Describe IPS deployment considerations
- Network-based IPS vs. host-based IPS
- Modes of deployment (inline, promiscuous - SPAN, tap)
- Placement (positioning of the IPS within the network)
- False positives, false negatives, true positives, true negatives
- Describe IPS technologies
- Rules/signatures
- Detection/signature engines
- Trigger actions/responses (drop, reset, block, alert, monitor/log, shun)
- Blacklist (static and dynamic)

#### *Content and Endpoint Security*

- Describe mitigation technology for email-based threats
- SPAM filtering, anti-malware filtering, DLP, blacklisting, email encryption
- Describe mitigation technology for web-based threats
- Local and cloud-based web proxies
- Blacklisting, URL filtering, malware scanning, URL categorization, web application filtering, TLS/SSL decryption
- Describe mitigation technology for endpoint threats
- Anti-virus/anti-malware
- Personal firewall/HIPS
- Hardware/software encryption of local data

## COURSE CCE150

Title: Implementing Cisco Secure Access Solutions (SISAS)

Exam: 300-208

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is one of the exams associated with the CCNP Security certification. This course will cover the components and architecture of secure access, by utilizing 802.1X and Cisco TrustSec. It includes knowledge of Cisco Identity Services Engine (ISE) architecture, solution, and components as an overall network threat mitigation and endpoint control solutions. It also includes the fundamental concepts of bring your own device (BYOD) using posture and profiling services of ISE. Candidates can prepare for this exam by taking the Implementing Cisco Secure Access Solutions (SISAS) course.

### **Course Objectives**

This course will cover the following subjects:

- Threat Mitigation through Identity Services
- Identity Services
- 802.1X and EAP
- Configure 802.1X Components
- ISE Fundamentals
- Describe Cisco ISE Features and configure the fundamentals
- Cisco ISE with PKI
- Cisco ISE Authentication
- Cisco ISE with External Authentication
- Advance Access Control
- Certificate Based User Authentication
- Authorization
- Cisco TrustSec
- Web Authentication and Guest Access
- Web Authentication
- Guest Access Services
- Endpoint
- Posture
- Profiler
- BYOD
- Troubleshooting Network Access Control
- Troubleshooting ISE
- View More

## COURSE CCE160

Title: Implementing Cisco Edge Network Security Solutions (SENS)

Exam: 300-206

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is one of the exams associated with the CCNP Security. The Implementing Cisco Edge Network Security Course includes the knowledge of a network security engineer to configure and implement security on Cisco network perimeter edge devices such as a Cisco switch, Cisco router, and Cisco ASA firewall. This course focuses on the technologies used to strengthen security of a network perimeter such as Network Address Translation (NAT), ASA policy and application inspect, and a zone-based firewall on Cisco routers.

### **Course Objectives**

This course will cover the following subjects:

- Secure Design Principles
- Course Overview
- Network Security Zoning
- Cisco Module Network Security Architecture
- Cisco SecureX Architecture
- Cisco TrustSec Solution
- Deploying Network Infrastructure Protection
- Introducing Cisco Network Infrastructure Protection
- Deploying Cisco IOS Control Plane Security Controls
- Deploying Cisco IOS Management Plane Security Controls
- Deploying Cisco ASA Management Plane Security Controls
- Deploying Cisco Traffic Telemetry Methods
- Deploying Cisco IOS Layer 2 and Layer 3 Data Plane Security Controls
- Deploying NAT on Cisco IOS and Cisco ASA
- Introducing Network Address Translation
- Deploying Cisco ASA Network Address Translation
- Deploying Cisco IOS Software Network Address Translation
- Deploying Threat Controls on Cisco ASA
- Introducing Cisco Firewall Threat Controls
- Deploying Basic Cisco ASA Access Policies
- Deploying Advanced Cisco ASA Application Inspection Policies
- Deploying Cisco ASA Botnet Traffic Filtering
- Deploying Cisco ASA Identity Based Firewall
- Deploying Threat Controls on Cisco IOS Software
- Deploying Basic Cisco IOS Software with Basic Zone-Based Firewall Access Policies
- Deploying Advanced Cisco IOS Software ZBFW with Application Inspection Policies

## COURSE CCE170

Title: Implementing Cisco Secure Mobility Solutions (SIMOS)

Exam: 300-209

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the Implementing Cisco Secure Mobility Solutions (SIMOS) tests a network security engineer on the variety of Virtual Private Network (VPN) solutions that Cisco has available on the Cisco ASA firewall and Cisco IOS software platforms. This course provides the knowledge necessary to properly implement highly secure remote communications through VPN technology, such as remote access SSL VPN and site-to-site VPN (DMVPN, FlexVPN). Candidates can prepare for this exam by taking the Implementing Cisco Secure Mobility Solutions (SIMOS) course.

### **Course Objectives**

This course will cover the following subjects:

- Fundamentals of VPN Technologies and Cryptography
- The Role of VPNs in Network Security
- VPNs and Cryptography
- Deploying Secure Site-to-Site Connectivity Solutions
- Introducing Cisco Secure Site-to-Site Connectivity Solutions
- Deploying Point-to-Point IPsec VPNs on the Cisco ASA
- Deploying Cisco IOS VTI-Based Point-to-Point IPsec VPNs
- Deploying Cisco IOS DMVPNs
- Deploying Cisco IOS Site-to-Site FlexVPN Solutions
- Introducing Cisco IOS Site-to-Site FlexVPN Solutions
- Deploying Point-to-Point IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Hub-and-Spoke IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Spoke-to-Spoke IPsec VPNs Using Cisco IOS FlexVPN
- Deploying Basic Cisco Clientless SSL VPN
- Clientless SSL VPN Overview
- Deploying Basic Cisco Clientless SSL VPN on Cisco ASA
- Deploying Application Access in Cisco ASA Clientless SSL VPN
- Deploying Advanced Authentication and Authorization in Clientless SSL VPN
- Deploying Cisco AnyConnect VPNs
- Deploying Basic Cisco AnyConnect SSL VPN on Cisco ASA
- Deploying Advanced Cisco AnyConnect SSL VPN on Cisco ASA
- Deploying Advanced Authentication and Authorization in Cisco AnyConnect VPNs
- Deploying Cisco AnyConnect IPsec/IKEv2 VPNs
- Deploying Endpoint Security and Dynamic Access Policies
- Implementing Host Scan
- Implementing DAP for SSL VPNs

## COURSE CCE180

Title: Implementing Cisco Threat Control Solutions (SITCS)

Exam: 300-210

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises is associated with the Cisco Certified Network Professional Security certification. The Implementing Cisco Threat Control Solutions (SITCS) provides a network security engineer on advanced firewall architecture and configuration with the Cisco next-generation firewall, utilizing access and identity policies. This Course covers integration of Intrusion Prevention System (IPS) and context-aware firewall components, as well as Web (Cloud) and Email Security solutions. Candidates can prepare for this exam by taking the Implementing Cisco Threat Control Solutions (SITCS) course.

### **Course Objectives**

This course will cover the following subjects:

- Cisco Web Security Appliance
- Cisco Web Security Appliance (WSA) Solutions
- Integrating the Cisco Web Security Appliance
- Configuring Cisco Web Security Appliance Identities and User Authentication Controls
- Configuring Cisco Web Security Appliance Acceptable Use Control
- Configuring Cisco Web Security Appliance Anti-Malware Controls
- Configuring Cisco Web Security Appliance Decryption
- Configuring Cisco Web Security Appliance Data Security Controls
- Cisco Cloud Web Security
- Cisco Cloud Web Security Solutions
- Configuring Cisco Cloud Web Security Connectors
- Web Filtering Policy in Cisco ScanCenter
- Cisco Email Security Appliance
- Cisco Email Security Solutions
- Cisco Email Security Appliance Basic Setup Components
- Configuring Cisco Email Security Appliance Basic Incoming and Outgoing Mail Policies
- Advanced Malware Protection for Endpoints
- AMP for Endpoints Overview and Architecture
- Customizing Detection and AMP Policy
- IOCs and IOC Scanning
- Deploying AMP Connectors
- AMP Analysis Tools
- Cisco FirePOWER Next-Generation IPS
- Cisco FireSIGHT System
- Configuring and Managing Cisco FirePOWER Devices
- Implementing an Access Control Policy
- Discovery Technology
- Configuring File-Type and Network Malware Detection
- Managing SSL Traffic with Cisco FireSIGHT
- IPS Policy and Configuration Concepts
- Network Analysis Policy
- Creating Reports
- Correlation Rules and Policies
- Basic Rule Syntax and Usage
- Cisco ASA FirePOWER Services
- Installing Cisco ASA 5500-X Series FirePOWER Services (SFR)

## COURSE CCE190

Title: VMware vSphere: Install, Configure, and Manage

Exam: 2V0-622

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises focuses on installing, configuring, and managing VMware vSphere, which includes VMware ESXi and VMware vCenter Server. This course prepares you to administer a vSphere infrastructure for an organization of any size. It is the foundation for most other VMware technologies in the software-defined data center.

### **Course Objectives**

This course will cover the following subjects:

#### *High Availability and Fault Tolerance*

- Introduce the new vSphere High Availability architecture
- Configure and manage a vSphere HA cluster
- Introduce vSphere Fault Tolerance
- Describe VMware vSphere Replication

#### *Scalability*

- Configure and manage a VMware vSphere Distributed Resource Scheduler cluster
- Configure Enhanced vMotion Compatibility
- Use vSphere HA and DRS together

#### *Patch Management*

- Use vSphere Update Manager to manage ESXi patching
- Install vSphere Update Manager and the vSphere Update Manager plug-in
- Create patch baselines
- Scan and remediate hosts

#### *Installing VMware Components*

- Introduce ESXi installation
- Describe boot-from-SAN requirements
- Introduce vCenter Server deployment options
- Describe vCenter Server hardware, software, and database requirements
- Install vCenter Server (Windows-based)

## Certified Network Technologies Expert (CNTE)

### Program Summary

This instructor-led program with a combination of lecture and hands-on laboratory exercises is our most comprehensive and diverse program combining the coursework of multiple disciplines. This program begins with a introductory class to fundamentals of networking which provides in-depth coursework basics of LAN and WAN environment and guides the student through multiple levels of network infrastructure study for Cisco, Juniper, Palo Alto, and other various environments. The goal of this program is to offer the student a single program to build the knowledge, skills, and certifications necessary to become a well-respected and well-trained professional poised to become a success in today's information technology environment.

- Certification program
- 1152 Contact Hours, 72 Credit Hours, 48 Weeks

### TERM 1

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CTE100	Technologies I	6	96
CTE110	Technologies II	6	96
CTE120	Technologies III	6	96
<b>Total</b>		<b>18</b>	<b>288</b>

### TERM 2

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CTE130	Technologies IV	6	96
CTE140	Technologies V	6	96
CTE150	Technologies VI	6	96
<b>Total</b>		<b>18</b>	<b>288</b>

### TERM 3

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CTE160	Technologies VII	6	96
CTE170	Technologies VIII	6	96
CTE180	Technologies IX	6	96
<b>Total</b>		<b>18</b>	<b>288</b>

### TERM 4

Course No.	Course Name	Quarter Credit Hours	Clock Hours
CTE190	Technologies X	6	96
CTE200	Technologies XI	6	96
CTE210	Technologies XII	6	96
<b>Total</b>		<b>18</b>	<b>288</b>

**Type of Document Received Upon Graduation**

Upon successfully completing all requirements of the programs offered at Brand College, the student will be awarded a Certificate of Completion.

**Certification Tests**

Performance on a certification test is based on a pass or fail. You must receive between 75% and 80%, depending on the test, to pass. It is encouraged to take each test as soon as you complete the corresponding course.

**Career Development**

Students who successfully complete this program will be prepared for midlevel to advanced professional opportunities in the IT field with emphasis on installation, configuration and maintenance of Local Area Network (LAN) and Wide Area Network (WAN) infrastructure. In addition, the students are qualified for positions involving the planning, installation, and maintenance of client workstation as well as server operating system, applications and network infrastructure services using Microsoft and Linux technologies. Although titles may vary by hiring organizations, students with these credentials are qualified to meet the requirements of positions such as Sr. Network Design Engineer, Sr. Network Systems Manager, Manager of Network Systems or similar designations.

This program also aligns with the following career opportunities classified by US Department of Labor under the Standard Occupational Classification (SOC) system.

- 25-1021 Computer Science Teacher, Postsecondary
- 15-1152 Computer Network Support Specialist
- 15-1143 Computer Network Architects



## **CNTE Program Details**

### **COURSE CTE100**

Title: Network+ Certification

Exam: CompTIA Exam N10-007

#### **Course Description**

CompTIA Network+ covers the configuration, management, and troubleshooting of common wired and wireless network devices. Also included are emerging technologies such as unified communications, mobile, cloud, and virtualization technologies.

#### **Course Objectives**

This course will cover the following subjects:

##### Network Concepts

- Explain Purposes and Uses of Ports and Protocols
- Explain devices, applications, protocols and services at their appropriate OSI layers
- Explain the concepts and characteristics of routing and switching
- Given a scenario, configure the appropriate IP addressing components
- Compare and contrast the characteristics of network topologies, types and technologies
- Given a scenario, implement the appropriate wireless technologies and configurations
- Summarize cloud concepts and their purposes
- Explain the functions of network services

##### Infrastructure

- Given a scenario, deploy the appropriate cabling solution
- Given a scenario, determine the appropriate placement of networking devices on a network and install/configure them
- Explain the purposes and use cases for advanced networking devices
- Explain the purposes of virtualization and network storage technologies
- Compare and contrast WAN technologies

##### Network Operations

- Given a scenario, use appropriate documentation and diagrams to manage the network
- Compare and contrast business continuity and disaster recovery concepts
- Explain common scanning, monitoring and patching processes and summarize their expected outputs
- Given a scenario, use remote access methods
- Identify policies and best practices

##### Network Security

- Summarize the purposes of physical security devices
- Explain authentication and access controls
- Given a scenario, secure a basic wireless network
- Summarize common networking attacks
- Given a scenario, implement network device hardening
- Explain common mitigation techniques and their purposes

#### Network Troubleshooting and Tools

- Explain the network troubleshooting methodology
- Given a scenario, use the appropriate tool
- Given a scenario, troubleshoot common wired connectivity and performance issues
- Given a scenario, troubleshoot common wireless connectivity and performance issues
- Given a scenario, troubleshoot common network service issues

## COURSE CTE110

Title: Cisco Certified Network Associate

Exam: 100-105

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers basic networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized. This is an advanced course providing the skills and knowledge necessary to pass the Cisco certification exam (one exam) necessary to become a Cisco Certified Network Associate (CCNA).

### **Course Objectives**

This course will cover the following subjects:

#### *Operation of IP Data Networks*

- Recognize the purpose and functions of various network devices such as Routers, Switches, Bridges and Hubs<sup>[1][SEP]</sup>
- Select the components required to meet a given network specification<sup>[1][SEP]</sup>
- Identify common applications and their impact on the network<sup>[1][SEP]</sup>
- Describe the purpose and basic operation of the protocols in<sup>[1][SEP]</sup>the OSI and TCP/IP models<sup>[1][SEP]</sup>
- Predict the data flow between two hosts across a network<sup>[1][SEP]</sup>
- Identify the appropriate media, cables, ports, and connectors<sup>[1][SEP]</sup>to connect Cisco network devices to other network devices and hosts in a LAN

#### *LAN Switching Technologies*

- Determine the technology and media access control method for Ethernet networks<sup>[1][SEP]</sup>
- Identify basic switching concepts and the operation of Cisco switches
- Configure and verify initial switch configuration including remote access management
- Verify network status and switch operation using basic utilities
- Describe how VLANs create logically separate networks and the need for routing between them
- Configure and verify VLANs<sup>[1][SEP]</sup>
- Configure and verify trunking on Cisco switches
- Identify enhanced switching technologies
- Configure and verify PVSTP operation

#### *IP Addressing*

- Describe the operation and necessity of using private and public IP addresses for IPv4 addressing<sup>[1][SEP]</sup>
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment<sup>[1][SEP]</sup>
- Identify the appropriate IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment<sup>[1][SEP]</sup>
- Describe the technological requirements for running IPv6 in conjunction with IPv4
- Describe IPv6 addresses

#### *IP Routing Technologies*

- Describe basic routing concepts
- Configure and verify utilizing the CLI to set basic router configuration
- Configure and verify operation status of a device interface
- Verify router configuration and network connectivity using

- Configure and verify routing configuration for a static or default route given specific routing requirements<sup>[[SEP]]</sup>
- Differentiate methods of routing and routing protocols
- Configure and verify OSPF
- Configure and verify interVLAN routing (Router on a stick)
- Configure SVI interfaces<sup>[[SEP]]</sup>
- Manage Cisco IOS Files
- Configure and verify EIGRP (single AS)

## COURSE CTE120

Title: Cisco Certified Network Associate

Exam: 200-105

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers basic networking concepts implemented on Cisco routers. Students will be introduced to the Cisco Internetworking Operating System (IOS) and its command structure. TCP/IP addressing and implementation, including subnetting, will be covered thoroughly. Wide Area Networking (WAN) implementations including ISDN, frame relay, and serial point-to-point (including T1), will be emphasized. This is an advanced course providing the skills and knowledge necessary to pass the Cisco certification exam (one exam) necessary to become a Cisco Certified Network Associate (CCNA).

### **Course Objectives**

This course will cover the following subjects:

#### *IP Services*

- Configure and verify DHCP (IOS Router)
- Describe the types, features, and applications of ACLs
- Configure and verify ACLs in a network environment
- Identify the basic operation of NAT
- Configure and verify NAT for given network requirements<sup>[1][2]</sup>
- Configure and verify NTP as a client<sup>[1][2]</sup>
- Recognize High availability (FHRP)
- Configure and verify syslog
- Describe SNMP v2 and v3

#### *Network Device Security*

- Configure and verify network device security features
- Configure and verify switch port security
- Configure and verify ACLs to filter network traffic<sup>[1][2]</sup>
- Configure and verify an ACLs to limit telnet and SSH access to the router

#### *Troubleshooting*

- Troubleshoot and correct common problems associated with IP addressing and host configurations<sup>[1][2]</sup>
- Troubleshoot and resolve VLAN problems
- Troubleshoot and resolve trunking problems on Cisco switches
- Troubleshoot and resolve ACL issues
- Troubleshoot and resolve Layer 1 problems
- Identify and correct common network problems<sup>[1][2]</sup>
- Troubleshoot and resolve spanning tree operation issues
- Troubleshoot and resolve routing issues
- Troubleshoot and resolve OSPF problems
- Troubleshoot and resolve EIGRP problems
- Troubleshoot and resolve interVLAN routing problems
- Troubleshoot and resolve WAN implementation issues
- Monitor NetFlow statistics<sup>[1][2]</sup>
- Troubleshoot EtherChannel problems

#### *WAN Technologies*

- Identify different WAN Technologies

- Configure and verify a basic WAN serial connection<sup>[1][2]</sup><sub>SEP</sub>
- Configure and verify a PPP connection between Cisco routers<sup>[1][2]</sup><sub>SEP</sub>
- Configure and verify frame relay on Cisco routers<sup>[1][2]</sup><sub>SEP</sub>
- Implement and troubleshoot PPPoE

## COURSE CTE130

Title: Implementing Cisco IP Routing

Exam: 300-101

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to use advanced IP addressing and routing in implementing scalability for Cisco ISR routers connected to LANs and WANs. The exam covers topics on Advanced IP Addressing, Routing Principles, Multicast Routing, IPv6, Manipulating Routing Updates, Configuring basic BGP, Configuring EIGRP, OSPF, and IS-IS.

### **Course Objectives**

This course will cover the following subjects:

- Identify Cisco Express Forwarding Concepts
- Explain General Network Challenges
- Describe IP Operations
- Explain TCP Operations
- Describe UDP Operations
- Recognize Proposed Changes to the Network
- Configure and Verify PPP
- Explain Frame Relay
- Identify, Configure, and Verify IPv4 addressing and subnetting
- Identify IPv6 Addressing and Subnetting
- Configure and Verify Static Routing
- Configure and Verify Default Routing
- Evaluate Routing Protocol Types
- Configure and Verify GRE
- Describe DMVPN
- Describe Easy Virtual Networking
- Describe IOS AAA Using Local Database
- Describe Device Security Using IOS AAA with TACACS+ and RADIUS
- Configure and Verify Device Access Control
- Configure and Verify Router Security Features
- Configure and Verify Device Management
- Configure and Verify SNMP
- Configure and Verify Logging
- Configure and Verify Network Time Protocol
- Configure and Verify IPv4 and IPv6 DHCP
- Configure and Verify IPv4 Network Address Translation
- Describe IPv6 NAT
- Describe SLA Architecture
- Configure and Verify IP SLA
- Configure and Verify Tracking Objects
- Configure and Verify Cisco NetFlow

## COURSE CTE140

Title: Implementing Cisco Switched Networks

Exam: 300-115

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to implement scalable multilayer switched networks. The exam includes topics on Campus Networks, describing and implementing advanced Spanning Tree concepts, VLANs and Inter-VLAN routing, High Availability, Wireless Client Access, Access Layer Voice concepts, and minimizing service Loss and Data Theft in a Campus Network.

### **Course Objectives**

This course will cover the following subjects:

- Configure and Verify Switch Administration
- Configure and Verify Layer 2 Protocols
- Configure and Verify VLANs
- Configure and Verify Trunking
- Configure and Verify EtherChannels
- Configure and Verify Spanning Tree
- Configure and Verify Other LAN Switching Technologies
- Describe Chassis Virtualization and Aggregation Technologies
- Configure and Verify Switch Security Features
- Describe Device Security Using Cisco IOS AA with TACACS+ and RADIUS
- Configure and Verify First-Hop Redundancy Protocols



## COURSE CTE150

Title: Troubleshooting and Maintaining Cisco IP Networks

Exam: 300-135

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises will certify that the successful candidate has important knowledge and skills necessary to secure and expand the reach of an enterprise network to (1) plan and perform regular maintenance on complex enterprise routed and switched networks and (2) use technology-based practices and a systematic ITIL-compliant approach to perform network troubleshooting.

### **Course Objectives**

This course will cover the following subjects:

- Use Cisco IOS Troubleshooting Tools
- Apply Troubleshooting methodologies
- Troubleshoot Switch Administration
- Troubleshoot Layer 2 Protocols
- Troubleshoot VLANs
- Troubleshoot Trunking
- Troubleshoot EtherChannels
- Troubleshoot Spanning Tree
- Troubleshoot other LAN Switching Technologies
- Troubleshoot Chassis Virtualization and Aggregation Technologies
- Troubleshoot IPv4 Addressing and Subnetting
- Troubleshoot IPv6 Addressing and Subnetting
- Troubleshoot Static Routing
- Troubleshoot Default Routing
- Troubleshoot Administrative Distance
- Troubleshoot GRE
- Troubleshoot IOS AAA using Local Database
- Troubleshoot Device Access Control
- Troubleshoot Router Security Features
- Troubleshoot Device Management
- Troubleshoot SNMP
- Troubleshoot Logging
- Troubleshoot Network Time Protocol
- Troubleshoot IPv4 and IPv6 DHCP
- Troubleshoot IPv4 Network Address Translation
- Troubleshoot SLA Architecture
- Troubleshoot Tracking Objects

## COURSE CTE160

Title: BGP

### **Course Description**

BCG is the protocol which is used to make core routing decisions on the Internet; it involves a table of IP networks or "prefixes" which designate network reachability among autonomous systems (AS). BGP is a path vector protocol or a variant of a Distance-vector routing protocol. BGP does not involve traditional Interior Gateway Protocol (**IGP**) metrics, but routing decisions are made based on path, network policies and/or rule-sets. For this reason, it is more appropriately termed a reachability protocol rather than routing protocol. BGP was created to replace the Exterior Gateway Protocol (**EGP**) to allow fully decentralized routing in order to transition from the core ARPAnet model to a decentralized system that included the NSFNET backbone and its associated regional networks. This allowed the Internet to become a truly decentralized system.

### **Course Objectives**

This course will cover the following subjects:

- Understanding BGP Building Blocks
- Comparing the Control Plane and Forwarding Plane.
- BGP Processes and Memory Use.
- BGP Path Attributes.
- Memory Use for IP CEF.
- Tuning BGP Performance
- TCP Protocol Considerations
- Path MTU Discovery, Queue Optimization
- Packet Reception Process. Hold Queue Optimization
- Effective BGP Policy Control
- How to Use Regular Expressions in Cisco IOS Software
- Filter Lists for Enforcing BGP Policies. Prefix Lists
- DESIGNING BGP ENTERPRISE NETWORKS
- Enterprise BGP Core Network Design
- Internet Connectivity for Enterprise Networks
- DESIGNING BGP SERVICE PROVIDER NETWORKS
- Scalable iBGP Design and Implementation Guidelines
- Route Reflection and Confederation Migration Strategies
- Service Provider Architecture
- General ISP Network Architecture
- Interior Gateway Protocol Layout
- The Aggregation Layer, Network Addressing Methodology, Loopback Addressing.
- IMPLEMENTING BGP MULTIPROTOCOL EXTENSIONS
- Multiprotocol BGP and MPLS VPN
- Route Distinguisher and VPN-IPv4 Address
- Understanding MPLS Fundamentals. MPLS Labels
- Multiprotocol BGP and Interdomain Multicast
- Multicast Distribution Trees
- Multiprotocol BGP Support for IPv
- IPv6 Enhancements, Expanded Addressing Capabilities, Autoconfiguration Capabilities
- MP-BGP Extensions for IPv6 NLRI, Dual-Stack Deployment, MP-BGP for IPv6 Deployment Considerations
- Configuring MP-BGP for IPv, BGP Address Family Configuration, Injecting IPv6 Prefixes into BGP
- Security Enhancements

- QoS Capabilities, IPv6 Addressing
- Anycast Address Functionality
- Aggregatable Global Unicast Addresses
- MP-BGP Extensions for IPv6 NLRI
- Multiprotocol BGP Extensions for CLNS Support
- Matrix of BGP Features and Cisco IOS Software Releases

## COURSE CTE170

Title: MPLS

### **Course Description**

MPLS is a highly scalable, protocol agnostic, data-carrying mechanism. In an MPLS network, data packets are assigned labels. Packet-forwarding decisions are made solely on the contents of this label, without the need to examine the packet itself. This allows one to create end-to-end circuits across any type of transport medium, using any protocol. The primary benefit is to eliminate dependence on a particular OSI model data link layer technology, such as Asynchronous (ATM), Frame Relay, Synchronous Optical Networking (SONET) or Ethernet, and eliminate the need for multiple layer-2 networks to satisfy different types of traffic. MPLS belongs to the family of packet-switched networks.

### **Course Objectives**

This course will cover the following subjects:

- MPLS VPN Architecture Overview
- MPLS VPN Terminology
- Connection-Oriented VPNs
- Connectionless VPNs
- MPLS-Based VPNs
- New MPLS VPN Developments
- Advanced PE-CE Connectivity
- Remote Access to an MPLS VPN
- Providing Dial-In Access to an MPLS VPN
- Providing Dial-Out Access via LSDO
- Providing Dial-Out Backup for MPLS VPN Access
- Providing DSL Access to an MPLS VPN
- Advanced features of MPLS VPN Remote Access
- PE-CE Routing Protocol Enhancements and Advanced Features
- PE-CE Connectivity: OSPF
- PE-CE Connectivity: Integrated IS-IS
- PE-CE Connectivity: EIGRP
- Virtual Router Connectivity
- Configuring Virtual Routers on CE Routers
- VRF Selection based on Source IP Address
- Performing NAT in a Virtual Router Environment
- Protecting MPLS-VPN Backbone
- Inherent Security Capabilities
- Neighbor Authentication
- CE-to-CE Authentication
- PE to CE Circuits
- Large-Scale Routing and Multiple Service Provider Connectivity
- Carrier Backbone Connectivity
- Label Distribution Protocols on PE-CE Links
- BCP-4 Between PE/CE Routers
- Hierarchical VPNs: Carrier's Carrier MPLS VPNs
- Multicast VPN
- Introduction to IP Multicast
- Enterprise Multicast in a Service Provider Environment
- MDTs
- IP Version 6 Transport Across an MPLS Backbone
- IPv6 Business Drivers

- Deployment of IPv6 in Existing Networks
- 6PE Operation and Configuration
- Introduction to Troubleshooting of MPLS-Based Solutions
- MPLS Control Plane Troubleshooting
- MPLS Data Plane Troubleshooting

## COURSE CTE180

Title: Implementing Cisco Wireless Network Fundamentals

Exam: 200-355

### **Course Description**

This instructor-led program with a combination of lecture and hands-on laboratory exercises covers the candidate's knowledge of installing, configuring, operating and troubleshooting. Upon completing this course, you will be able to understand the basic RF principles and characteristics and WLAN security methods and access with differing client devices. Define the Cisco WLAN architecture and the underlying infrastructure used to support it. Implement a Centralized wireless access network using AireOS or IOS-XE wireless LAN controllers. Implement a Converged wireless access network using IOS-XE converged access switches and wireless LAN controllers. Implement small and remote access wireless networks using FlexConnect, Autonomous or Cloud architectures. Perform basic WLAN maintenance and troubleshooting -describe the requirements for a WLAN design.

### **Course Objectives**

This course will cover the following subjects:

#### *RF Fundamentals*

- Describe the propagation of radio waves
- Frequency, amplitude, phase, wavelength
- Absorption, reflection, diffraction, scattering, refraction, fading, free space path loss, multipath
- Interpret RF signal measurements
- Signal Strength
- Differentiate interference vs. noise
- Define SNR
- Explain the principles of RF mathematics
- Describe Wi-Fi antenna characteristics
- Ability to read a radiation pattern chart
- Antenna types and uses

#### *Technology Fundamentals*

- Describe basic Wi-Fi governance
- Describe regional regulatory bodies
- IEEE 802.11
- Wi-Fi Alliance
- Describe usable channel and power combination
- Regional EIRP limitation examples
- Describe RRM fundamentals
- Describe 802.11 fundamentals
- Modulation techniques
- Channel width
- Wireless topologies
- Frame types

#### *Implementing a Wireless Network*

- Describe the various Cisco Wireless architecture
- Cloud
- Autonomous
- Split MAC
- Describe physical infrastructure connections

- Wired infrastructures
- Describe AP and WLC management access connections
- IP addressing: IPv4 / IPv6
- Management via wireless

#### *Operating a Wireless Network*

- Execute initial setup procedures Cisco wireless infrastructures
- Converged
- Centralized
- Autonomous
- Describe the Cisco implementation of the CAPWAP discovery and join process
- DHCP
- DNS
- Master-controller
- Distinguish different lightweight AP modes
- Describe and configure the components of a wireless LAN access for client connectivity using GUI only
- Identify wireless network and client management and configuration platform options
- Maintain wireless network

#### *Configuration of Client Connectivity*

- Identify authentication mechanisms
- LDAP, RADIUS, local authentication, WebAuth, 802.1X, PSK
- Configuring WLAN authentication mechanisms on the controller
- Configure client connectivity in different operating systems
- Describe roaming
- Describe wireless guest networking

#### *Performing Client Connectivity Troubleshooting*

- Validating WLAN configuration settings at the infrastructure side
- Security settings
- SSID settings
- Validating AP infrastructure settings
- Port level configuration
- Power source
- Validate client settings
- Employ appropriate controller tools to assist troubleshooting
- Identify appropriate third-party tools to assist troubleshooting

#### *Site Survey Process*

- Describe site survey methodologies and their purpose
- Describe passive and active site surveys
- Spectrum analyzer
- Site surveying software
- Describe the requirements of client real-time and non-real-time applications

## COURSE CTE190

Title: Junos Associate (JNCIA-Junos)

Exam: JNO-102

### **Course Description**

The courses in this path cover all of the entry-level skills and knowledge that you'll need to get started with Juniper Networks. You'll cover basics of the Juniper Networks Junos OS, networking fundamentals, and basic routing and switching. By the end of this path, you'll have covered the concepts and objectives necessary for taking the Juniper Networks Certified Associate – Junos (JNCIA-Junos) JNO-102 exam. Completing this path will help you prepare for the exam and get yourself started in the world of Juniper Networks.

### **Course Objectives**

This course will cover the following subjects:

#### *Networking Fundamentals*

- Collision domains and broadcast domains
- Function of routers and switches
- Optical network fundamentals – SONET/SDH, OTN
- Ethernet networks
- Layer 2 addressing, including address resolution
- IPv4 and IPv6 fundamentals
- Layer 3 / IP addressing, including subnet masks
- Subnetting and supernetting
- Decimal to binary conversion
- Longest match routing
- Connection-oriented vs. connectionless protocols

#### *Junos OS Fundamentals*

- Junos device portfolio – product families, general functionality
- Software architecture
- Control and forwarding planes
- Routing Engine and Packet Forwarding Engine
- Protocol daemons
- Transit traffic processing
- Exception traffic

#### *User Interfaces*

- CLI functionality
- CLI modes
- CLI navigation
- CLI Help
- Filtering output
- Active vs. candidate configuration
- Reverting to previous configurations
- Modifying, managing, and saving configuration files
- Viewing, comparing, and loading configuration files
- J-Web – core/common functionality

#### *Junos Configurations Basics*

- Factory-default state
- Initial configuration



- User accounts
- Login classes
- User authentication methods
- Interface types and properties
- Configuration groups
- Additional initial configuration elements – NTP, SNMP, syslog, etc.
- Configuration archival
- Logging and tracing
- Rescue configuration

#### *Operational Monitoring and Maintenance*

- Show commands
- Monitor commands
- Interface statistics and errors
- Network tools – ping, traceroute, telnet, SSH, etc.
- Real-time performance monitoring (RPM)
- Junos OS installation
- Software upgrades
- Powering on and shutting down Junos devices
- Root password recovery

#### *Routing Fundamentals*

- Packet forwarding concepts
- Routing tables
- Routing vs. forwarding tables
- Route preference
- Routing instances
- Static routing
- Advantages of / use cases for dynamic routing protocols

#### *Routing Policy and firewall filters*

- Default routing policies
- Import and export policies
- Routing policy flow
- Effect of policies on routes and routing tables
- Policy structure and terms
- Policy match criteria, match types, and actions
- Firewall filter concepts
- Filter match criteria and actions
- Effect of filters on packets
- Unicast reverse-path-forwarding (RPF)

## COURSE CTE200

Title: Firewall 8.1 Essentials

Test: PCNSE

### **Course Description**

A Palo Alto Networks Certified Network Security Engineer (PCNSE) is capable of designing, deploying, configuring, maintaining and troubleshooting the vast majority of Palo Alto Networks-based network security implementations. Passing the PCNSE and exhibiting solid professional behavior, are the requirements for becoming a PCNSE. The formal certification exam is hosted and proctored by the third-party testing company Pearson VUE. Either exam should be taken by anyone who is prepared to demonstrate a deep understanding of Palo Alto Networks technologies. Candidates can be anyone who uses Palo Alto Networks products, including customers, partners, system engineers, systems integrators and support engineers.

### **Course Objectives**

This course will cover the following subjects:

- Next-Generation Security Platform and Architecture
- Virtual and Cloud Deployment
- Initial Configuration
- Interface Configuration
- Security and NAT policies
- App-IDTM
- Content-IDTM
- URL Filtering
- Decryption
- WildFire
- User-IDTM
- GlobalProtectTM
- Site-to-Site VPNs
- Monitoring and Reporting
- Active/Passive High Availability
- Next-Generation Security Practices

## COURSE CTE210

Title: Automating Network Tasks with Python Programing

### **Course Description**

Automation is a key to keep pace with ever changing and increasing requirements and high complexity of modern networks. Today's network engineers need a basic understanding of programming and corresponding tools. Python is the most popular programming language used for network automation. Python excels at offering easy GUI programming and extensive libraries. This course teaches the candidates the necessary basic knowledge to write scripts and programing with Python.

### **Course Objectives**

This course will cover the following subjects:

#### *Python Basics*

- Entering Expressions into the Interactive Shell
- The Integer, Floating-Point, and String Data Types
- String Concatenation and Replication
- Storing Values in Variables
- First Program
- Dissecting the Program

#### *Flow Chart*

- Boolean Values
- Comparison Operators
- Boolean Operators
- Mixing Boolean and Comparison Operators
- Elements of Flow Chart Control
- Program Execution
- Flow Control Statements
- Importing Modules
- Ending a Program Early with sys.exit

#### *Functions*

- def Statements with Parameters
- Return Values and Return Statements
- The None Value
- Keyword Arguments and print
- Local and Global Scope
- Exception Handling
- A Short Program: Guess the Number

#### *Lists*

- The List Data Type
- Working with Lists
- Augmented Assignment Operators
- Methods
- Example Program: Magic 8 Ball with a List
- List-Like Types: Strings and Tuples
- Mutable and immutable Data Types
- Passing References
- The copy Module's copy and deepcopy Functions

### *Dictionaries and Structuring Data*

- The Dictionary Data type
- Dictionaries vs. Lists
- The keys, values, and items Methods
- Checking Whether a key or Value Exists in a Dictionary
- The get Method
- The setdefault Method
- Pretty Printing
- Using Data Structures to Model Real-World Things
- A Tic-Tac-Toe Board
- Nested Dictionaries and Lists

### *Manipulating Strings*

- Working with Strings
- String Literals
- Indexing and Slicing Strings
- The in and not in Operators with strings
- Useful String Methods
- The upper, lower, isupper, and islower String Methods
- The isX String Methods
- The startswith and endswith String Methods
- The join and split String Methods
- Justifying Text with rjust, ljust, and center
- Removing Whitespace with strip,rstrip, and lstrip
- Copying and Pasting Strings with pyperclip Module

### *Reading and writing Files*

- Files and File Paths
- Backslash on Windows and Forward Slash on OS X and Linux
- The Current Working Directory
- Absolute vs. Relative Paths
- Creating New Folders with os.makedirs
- The os.path Module
- Handling Absolute and Relative Paths
- Finding File Sizes and Folder Contents
- Checking Path Validity
- The File Reading/Writing Process
- Opening File with open Function
- Reading the Contents of the Files
- Writing to Files
- Saving Variables with the shelve Module
- Saving Variables with pprint.pformat Function

### *Project: Automation Task with Python*

- Automating Network Task with Paramiko
- Automating Network Task with Netmiko
- Automating Network Task with Napalm

## 2019 – 2020 Academic Calendar

<b>Administrative Hours:</b>	Monday – Friday	10:00 AM to 02:00 PM PST
<b>Academic Hours:</b>	Monday – Thursday	06:30 PM to 10:30 PM PST
	Saturday – Sunday	08:00 AM to 05:00 PM PST

### 2019 Winter Quarter:

Monday January 07 Term Begins

Sunday March 31 Term Ends

*April 01 - April 07 Administrative Week (School Closed)*

### 2019 Spring Quarter:

Monday April 08 Term Begins

Monday May 27 Memorial Day

Sunday June 30 Term Ends

*July 01 - July 07 Administrative Week (School Closed)*

### 2019 Summer Quarter:

Monday July 08 Term Begins

Monday September 02 Labor Day

Sunday September 29 Term Ends

*September 30 - October 06 Administrative Week (School Closed)*

### 2019 Fall Quarter:

Monday October 07 Term Begins

Thursday November 28 Thanksgiving

Sunday December 29 Term Ends

*December 30 – January 05 Holidays (School Closed)*

*The school reserves the right to cancel a class due to insufficient enrollment.*

### 2020 Winter Quarter:

Monday January 06 Term Begins

Sunday March 29 Term Ends

*March 30 - April 05 Administrative Week (School Closed)*

### 2020 Spring Quarter:

Monday April 06 Term Begins

Monday May 25 Memorial Day

Sunday June 28 Term Ends

*June 29 - July 05 Administrative Week (School Closed)*

### 2020 Summer Quarter:

Monday July 06 Term Begins

Sunday September 27 Term Ends

*September 28 - October 04 Administrative Week (School Closed)*

### 2020 Fall Quarter:

Monday October 05 Term Begins

Thursday November 26 Thanksgiving

Sunday December 27 Term Ends

*December 28 – January 03 Holidays (School Closed)*