COURSE SYLLABUS

**Cisco Certified Internetwork Expert (CCIE) Lab
Routing and Switching**

50 Cragwood Rd, Suite 350
South Plainfield, NJ 07080

Victoria Commons, 613 Hope Rd Building #5,
Eatontown, NJ 07724

130 Clinton Rd,
Fairfield, NJ 07004

Avtech Institute of Technology Course

Instructor:
Course Duration: 70 hours / 12 weeks
Date/Time:
Training Location:

Course: CCIE

Text / Lab Books:

Recommended: visit www.cisco.com for books

Course Content

The intense 12 sessions, hands-on course will expose you to network situations that you are likely to experience when taking the CCIE practical lab exam. It is dedicated to CCIE level labs with guidance and assistance from the instructor. This is going to be 90% hands-on and must have all the pre-requisites for the class. We'll teach you the technologies, help you become familiar with Cisco's testing techniques and share our unique methodology for passing the exam. This course will also help you assess your strengths and weaknesses by testing your knowledge on topics found exclusively on the CCIE Lab Routing and Switching exam such as IPv6, QoS, Advanced Filtering, DHCP, HSRP, IP Services, System Management, NAT, NTP, IP Multicasting, AAA, TACACS+, Radius, CBAC, advanced access lists (reflexive, lock and key, etc.), and IOS Services. The course content concentrates on a limited number of technologies and protocols, which provides adequate time for the student to fully understand the intricacies of each technology. This course does not cover introductory material, so students are expected to have, at minimum, CCNP-level knowledge of the topics covered. Please come well prepared.

After completing this course, students will be able to:
- Learn how to quickly complete CCIE questions involving Ethernet type codes;
- Learn how to write detailed Access Expressions and other advanced filters;
- Learn IPv6 from the basics to the advanced configurations tested on the Routing and Switching lab;
- Learn advanced multicast configurations and topologies tested in the lab;
- Review the QoS techniques most likely to be seen on the CCIE lab;
- Learn how to quickly spot which QoS technique to use for a particular problem;
- Memorize six quick steps that will guarantee successful IPSec establishment. Learn how to quickly spot IPSec misconfigurations;
- Learn advanced IOS features that are poorly documented but are covered on the exam;
- Study advanced stateful access-lists with a detailed discussion of their differences;
Receive a complete CCIE practice lab designed to simulate the actual test.

Course Outline

Class 1

    I.   CCIE R&S Written and Lab Exams Overview
   II.   CCIE R&S Written and Lab Exams Blueprints
  III.   Frame Relay Configuration
  IV.   Configuring Routing Protocols over NBMA Networks

Lab One

Class 2

    I. IP Routing Principles
   II. Advanced RIP Configuration
  III. Advanced OSPF Configuration
  IV. Advanced EIGRP Configuration

Lab Two

Class 3

    I. Redistribution
   II. Policy-Based Routing
  III. BGP Fundamentals

Lab Three

Class 4

    I. Advanced BGP
- BGP Route Selection and Attribute Manipulation
- BGP Route Aggregation
- BGP Policy
- BGP Default Route
- BGP and IGP Interaction
- Miscellaneous BGP Commands

Lab Four

Class 5

    I. Advanced Switching Configuration
- VLAN Trunking Protocol (VTP)
- Cat3550 Configuration
- Spanning Tree Protocol (STP)
- 802.1Q-in-Q Tunneling and Layer 2 Protocol Tunneling
- Multilayer Switching (MLS)

Lab Five

Class 6

   I. Basic IPv6
- IPv6 Addressing
- IPv6 Routing Protocols: static, RIPng, OSPFv3
- IPv4 to IPv6 Transitions

Lab Six

Class 7

   I. IP Multicasting: Basic IP Multicast
  II. Advanced IP Multicasting
- Bidirectional PIM
- Source Specific Multicast (SSM)
- Multicast Source Discovery Protocol (MSDP) and Anycast RP
- CGMP and IGMP Snooping
- Multicast over GRE Tunnel
- IP Multicast Helper Maps

Lab Seven

Class 8

   I. Advanced IP Multicasting (cont.)
- Pragmatic General Multicast (PGM)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Multicast Routing Monitor (MRM)

  II. MP-BGP for IPv6
 III. Overlay Tunnels for IPv6

Lab Eight

Class 9

   I. Cisco QoS Features
- Classification: PBR, CBPM, NBAR, CAR, QoS for VPN, QoS over BGP
- Congestion Management: Queuing – PQ, CQ, WFQ, CBWFQ, LLQ
- Policing and Shaping: GTS, Frame Relay Traffic Shaping, Class-Based Shaping
- Congestion Avoidance: WRED, CAR
- Signaling: IP Precedence, DSCP, RSVP
- Link Efficiency Mechanisms
- QoS Solutions: QoS Features for Voice, Cisco AutoQoS
- IPv6 QoS Support

Lab Nine

Class 10
I. System Management
II. IP Services
III. Various Access Control Lists
IV. Network Address Translation - Protocol Translation (NAT-PT) for IPv6

Lab Ten

Class 11
I. Cisco Security Features
  − Catalyst3550 Switch Security
  − TCP Intercept (Preventing Denial-of-Service Attacks)
  − Context-Based Access Control (CBAC)
  − Passwords and Privileges
  − Unicast Reverse Path Forwarding
  − 802.1X Port-Based Authentication
  − Authentication, Authorization, and Accounting (AAA)
  − Virtual Private Network (VPN), IPSec Network Security and Internet Key Exchange (IKE) Security Protocol
  − Wireless Security

Lab Eleven

Class 12
I. Course Wrap Up
II. CCIE Lab Exam taking strategy, tips, and hints.

Lab Twelve

Prerequisite

Students who attend this advanced course must have experience in configuring Cisco IOS software and have met the following prerequisites:
- Certifications as a CCNP or the equivalent knowledge.
- Thoroughly understanding of networking essentials, terms and concepts.
- Basic knowledge of the Windows operating system.

Who Needs To Attend

This course is designed for network professionals preparing for the CCIE Routing and Switching Lab Exam.

Contact Hours

_____ Contact Hours   (Lecture ____ Hours / Lab _____ Hours)

Semester Credit Hours

_____ semester credit hours

Teaching Strategies

A variety of teaching strategies may be utilized in this course, including but not limited to, lecture, discussion, written classroom exercises, written lab exercises, performance based lab exercises, demonstrations, quizzes and examinations. Some quizzes may be entirely or contain lab based components. A mid-course and end course examination will be given.

Method of Evaluating Students

Grade Distribution

Class Attendance	10
Mid Term	30
Finals	50
Special Projects Makeup projects	10
Total	**100%**

Grading Policy

At the end of each course, each student is assigned a final grade as follows:

Point Range	Interpretation	Grade	Quality Points
90 – 100	Excellent	A	4.0
80 – 89	Very Good	B	3.0 – 3.9
70 – 79	Average	C	2.0 – 2.9
60 – 69	Poor	D	1.0 – 1.9
Below 60	Failure	F	0
N/A	Withdrawal	W	0
N/A	Pass	P	0
N/A	Incomplete	I	0

A student earning a grade of D or above is considered to have passed the course and is eligible to pursue further studies. A student receiving a grade of F has failed the course. A failed course must be repeated and passed to meet Avtech Institute's graduation requirements, in addition to an overall program GPA of 2.0.

Requirements for Successful Completion of the Course

At a minimum, students must achieve the following:

- A passing grade of **D** or above

- Completion of all required examinations

- Submission of all required lab exercises and projects and;

- Adherence to the school attendance policy.

Equipment Needed

Industry standard desktop computer for lab exercises.

Equipment Breakdown Lab room

Videos and Projector

Library Assignments

To be determined by the instructor.

Portfolio Assignment

Student program outcome portfolios are required to demonstrate student competencies. In conjunction with your course structure, please select a project/paper that best demonstrates what you have learned in this course and add it to your program portfolio.

Course Policies

Disruptive Behavior

Disruptive behavior is an activity that interferes with learning and teaching. Inappropriate talking during class, surfing inappropriate website, tardiness, cheating, alcohol or drug use, use of cell phone, playing lout music during class, etc. all disrupt the learning process.

Copyright Infringement

Specific exemptions to copyright infringement are made for student use in the context of learning activities. Graphic design students often download images from the Internet, or scan images from publications. As long as this work is for educational purpose, and subject to faculty permission, this is not a problem.

Plagiarism

Faculty cannot tolerate the *misrepresentation of work as the student's own*. This often involves the use by one student or another student's design, whether voluntarily or involuntarily. In the event that plagiarism is evident and documented, all students involved in the conscious decision to misrepresent work must receive an F as the grade for the project. A second occurrence may result in suspension for the rest of the quarter, and return to the school only after a review by the Academic Standards Committee.

Attendance

Attendance and Lateness

In education and the workplace, regular attendance is necessary if individuals are to excel. There is a direct correlation between attendance and academic success. Attendance is mandatory. All students must arrive on time and prepared to learn at each class session. At the faculty member's discretion, students may be marked absent if they arrive more than 15 minutes late to any class. More that five absences in a class that meets twice per week or more that two absences in a class that meets once per week may result in a failure.

Make-Up Work

Late Projects and Homework

All projects and homework must be handed in on time. Homework should be emailed to your instructor if you are going to miss a class. Work that is submitted one week late will result in the loss of one full grade; and work that is submitted two weeks late will result in the loss of two full grades; more than two weeks late you will receive a failing grade on the project.