

# ICT Infrastructure & Network Management

*Postgraduate Degree Programme  
Hogeschool-Universiteit Brussel  
2014-2015*

## Context

The HUB University College offers a wide range of postgraduate and other courses for alumni students and other ICT professionals.

This document describes the postgraduate course on **ICT Infrastructure & Network Management**.

The postgraduate course offers modules in two domains

- internet and network design & management
- system and server virtualization

The networking courses are developed in close collaboration with Cisco Systems as a part of the global **Cisco Networking Academy** project. Moreover, all courses prepare for official Cisco Certification Exams.

The virtualization course is developed in collaboration with **VMware IT Academy** and leads to VMware VCP Certification.

## Opportunity

The Internet is changing life as we know it—bringing new economic and social opportunities to communities throughout the world, and increasing the global demand for information and communication technology (ICT) skills. Innovations such as social networking, cloud computing, the Internet of Everything, e-commerce, web conferencing, and desktop virtualization are changing the way we live, work, play, and learn. These capabilities are all powered by networks, and organizations around the world are experiencing a shortage of qualified ICT candidates to design, install, and manage these networks.

# Target Audience

The curriculum is aimed at ICT professionals seeking enterprise-level networking and system management skills, preparing them for job roles such as system engineer, system integrator, network engineer and network consultant.

The courses are open for people with a degree in higher education. Others are free to apply by providing a detailed overview of relevant professional experience.

# List of Course Modules

Code	Course Module	Level	ECTS	Prerequisite
NM01	<b>Interconnecting Network Devices 1</b>	CCNA	8	-
NM02	<b>Interconnecting Network Devices 2</b>	CCNA	8	NM01 or CCENT
NM03	<b>Network Security</b>	CCNA	8	NM01 or CCENT
NM04	<b>Advanced Switching</b>	CCNP	10	NM02 or CCNA
NM05	<b>Advanced Routing</b>	CCNP	10	NM02 or CCNA
NM06	<b>System Virtualization</b>	VCP	8	NM01 or CCENT
NM07	<b>System &amp; Network Design Case Study</b>	PG	8	NM03/04/05

The programme has a modular design allowing you to choose the modules that best fit your situation. You can start with modules NM01, NM02 or NM03 depending on your background and experience. The last column above indicates the prerequisites for each module. The core of the programme are the modules NM03, NM04 and NM05. In order to obtain the postgraduate certification you have to earn 30 erts credits and complete a case study (NM07).

All courses are online and include minimally 36 hours of intensive lab work.

Apart from the intensive hands-on labs you can improve your knowledge and understanding taking online tests and doing simulation exercises.

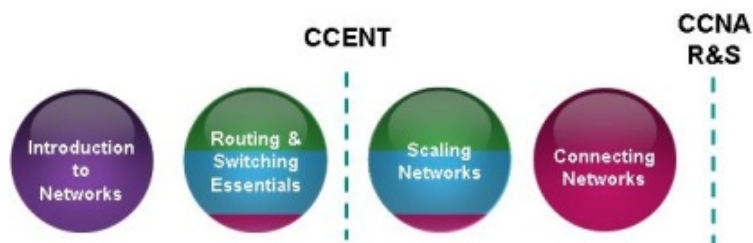
# Course Content

## CCNA Level Courses

### Cisco Certified Networking Associate

**CCNA Routing and Switching** provides a comprehensive overview of networking concepts and skills, from network applications to the protocols and services provided to those applications by the lower layers of the network.

The first two modules teach you all the way towards the CCENT and CCNA R&S certification levels. The image below displays the four courses that make up the modules 1 and 2 in our degree programme.



### Module 1: Interconnecting Network Devices 1 Cisco Certified Networking Associate (CCENT)

This course leads to CCENT Certification and is composed of two fundamental CCENT courses. For this course the main prerequisite is that you are fluent with PC's, laptops, tablets, smartphones and the Internet.

<p><b>Code:</b> NM01  <b>Level:</b> CCNA  <b>ECTS:</b> 8  <b>Lab Work:</b> 36 hours  <b>Price:</b> 550</p>	<p><b>Lab Room:</b> 5306  <b>Day:</b> Monday or Wednesday  <b>Time:</b> 18-21  <b>Semester:</b> 1 - (2)  <b>Prerequisite:</b> Fluency in ICT and Internet</p>
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<p><b>CCNA Routing and Switching: Introduction to Networks</b></p> <ul style="list-style-type: none"> <li>• Exploring the Network</li> <li>• Configuring a Network Operating System</li> <li>• Network Protocols and Communications</li> <li>• Network Access</li> <li>• Ethernet</li> <li>• Network Layer</li> <li>• Transport Layer</li> <li>• IP Addressing</li> <li>• Subnetting IP Networks</li> <li>• Application Layer</li> </ul>	<p><b>Routing &amp; Switching Essentials</b></p> <ul style="list-style-type: none"> <li>• Introduction to Switched Networks</li> <li>• Basic Switching Concepts and Configuration</li> <li>• VLANs</li> <li>• Routing Concepts</li> <li>• Inter-VLAN Routing</li> <li>• Static Routing</li> <li>• Routing Dynamically</li> <li>• Single-Area OSPF</li> <li>• Access Control Lists</li> <li>• DHCP</li> <li>• Network Address Translation for IPv4</li> </ul>
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## Module 2: Interconnecting Network Devices 2

### Cisco Certified Networking Associate Routing & Switching

This course leads to CCNA R&S Certification and is composed of the two CCNA routing and switching courses. If you have finished NM01 or are CCENT certified you can enroll for this course.

<p><b>Code:</b> NM02  <b>Level:</b> CCNA  <b>ECTS:</b> 8  <b>Lab Work:</b> 36 hours  <b>Price:</b> 550</p>	<p><b>Lab Room:</b> 5306  <b>Day:</b> Monday or Wednesday  <b>Time:</b> 18-21  <b>Semester:</b> 1 - (2)  <b>Prerequisite:</b> NM01 or CCENT ICND1</p>
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<p><b>CCNA Routing and Switching: Scaling Networks</b></p> <ul style="list-style-type: none"> <li>• Introduction to Scaling Networks</li> <li>• LAN Redundancy</li> <li>• Link Aggregation</li> <li>• Wireless LANs</li> <li>• Adjust and Troubleshoot Single-Area OSPF</li> <li>• Multiarea OSPF</li> <li>• EIGRP</li> <li>• EIGRP Advanced Configurations and Troubleshooting</li> <li>• IOS Images and Licensing</li> </ul>	<p><b>CCNA Routing and Switching: Connecting Networks</b></p> <ul style="list-style-type: none"> <li>• Broadband Solutions</li> <li>• Hierarchical Network Design</li> <li>• Connecting to the WAN</li> <li>• Point-to-Point Connections</li> <li>• Frame Relay</li> <li>• Network Address Translation for IPv4</li> <li>• Broadband Solutions</li> <li>• Securing Site-to-Site Connectivity</li> <li>• Monitoring the Network</li> <li>• Troubleshooting the Network</li> </ul>
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## CCNA Security

CCNA Security introduces the core security concepts and skills needed to install, troubleshoot, and monitor a network to maintain the integrity, confidentiality, and availability of data and devices.

CCNA Security is a hands-on, career-oriented e-learning solution with an emphasis on practical experience to help develop specialized security skills to advance their careers.

### Module 3: Network Security

#### IOS Network Security

This course leads to CCNA SECURITY Certification. The main parts of this course are authentication, authorization, intrusion prevention, firewalls and virtual private networks. If you have finished NM01 or are CCENT certified you can enroll for this course.

<b>Code:</b> NM03 <b>Level:</b> CCNA Specialist <b>ECTS:</b> 8 <b>Lab Work:</b> 36 hours <b>Price:</b> 550	<b>Lab Room:</b> 5306 <b>Day:</b> Thursday <b>Time:</b> 16-19 <b>Semester:</b> 1 - (2) <b>Prerequisite:</b> NM01 or CCENT ICND1
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<b>CCNA Security: Implementing Network Security v1.1</b>  <ol style="list-style-type: none"><li>1. Network Security Threats</li><li>2. Securing Network Devices</li><li>3. Authentication, Authorization and Accounting</li><li>4. Implementing Firewall Technologies</li><li>5. Implementing Intrusion Prevention</li></ol>	<ol style="list-style-type: none"><li>6. Securing Local Area Networks</li><li>7. Cryptographic Systems</li><li>8. Implementing Virtual Private Networks</li><li>9. Managing Secure Networks</li><li>10. Implementing Cisco Adaptive Security Appliance (ASA)</li></ol>
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## CCNP Level Courses

### Cisco Certified Networking Professional

CCNP teaches the advanced skills needed to install, configure, monitor, and troubleshoot enterprise-sized networks and manage wireless, security, and voice applications.

CCNP equips students with the knowledge and skills needed to plan, implement, secure, maintain, and troubleshoot converged enterprise networks. The curriculum consists of three courses that employ industry-relevant instructional approaches to help students prepare for professional career opportunities.

## Module 4: Advanced Switching

### CCNP SWITCH: Implementing IP Switching

This course leads to CCNP SWITCH Certification. If you have finished NM02 or are CCNA certified you can enroll for this course.

<b>Code:</b> NM04 <b>Level:</b> CCNP <b>ECTS:</b> 10 <b>Lab Work:</b> 36 hours <b>Price:</b> 550	<b>Lab Room:</b> 5306 <b>Day:</b> Wednesday or Thursday <b>Time:</b> 18-21 <b>Semester:</b> (1) - 2 <b>Prerequisite:</b> NM02 or CCNA ICND2
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#### Course Description

- Enterprise Campus Architecture
- Implement VLANs in campus networks
- Implement, monitor, and maintain spanning tree protocol in an enterprise campus network
- Implementing InterVLAN Routing • Implement, monitor, and maintain interVLAN routing in an enterprise campus network
- Implementing High Availability and Redundancy in a Campus Network
- Implementing LAN security
- Preparing the Campus Infrastructure for Advanced Services

## Module 5: Advanced Routing

### CCNP ROUTE: Implementing IP Routing

This course leads to CCNP ROUTE Certification. If you have finished NM02 or are CCNA certified you can enroll for this course.

<b>Code:</b> NM05 <b>Level:</b> CCNP <b>ECTS:</b> 10 <b>Lab Work:</b> 36 hours <b>Price:</b> 550	<b>Lab Room:</b> 5306 <b>Day:</b> Wednesday or Thursday <b>Time:</b> 18-21 <b>Semester:</b> 1 - (2) <b>Prerequisite:</b> NM02 or CCNA ICND2
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#### Course Description

- Routing Services
- Implement EIGRP in an enterprise network
- Implement OSPF in an enterprise network
- Implement various mechanisms for controlling routing updates and traffic
- Implement path control using IP SLA and PBR
- Implementing a a Border Gateway Protocol Solution for ISP connectivity
- Implementing Routing Facilities for Branch Offices and Mobile Workers
- Implementing IPv6 in an Enterprise Network

## Free extra module

### CCNP TSHOOT: Maintaining and Troubleshooting IP Networks

This hands-on course teaches how to monitor and maintain complex, enterprise routed and switched IP networks.

## SYSTEM VIRTUALIZATION

### VMWARE CERTIFIED PROFESSIONAL (VCP)

#### Module 6: System Virtualization

#### VMware vSphere: Install, Configure, Manage

This course leads to VMWARE VCP Certification and explores the installation, configuration, and management of VMware vSphere, which consists of VMware ESXi and VMware vCenter Server. If you have finished NM01 or are CCENT certified you can enroll for this course.

<b>Code:</b> NM06 <b>Level:</b> VCP <b>ECTS:</b> 8 <b>Lab Work:</b> 36 hours <b>Price:</b> 550	<b>Lab Room:</b> 5306 <b>Day:</b> Tuesday <b>Time:</b> 16-19 <b>Semester:</b> 1 - (2) <b>Prerequisite:</b> NM01 or CCENT ICND1
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#### Course Description

- Install and configure ESXi
- Install and configure vCenter Server components
- Configure and manage ESXi networking and storage using vCenter Server
- Deploy, manage, and migrate virtual machines
- Manage user access to the VMware infrastructure
- Use vCenter Server to monitor resource usage
- Use vCenter Server to increase scalability
- Use VMware vCenter Update Manager to apply ESXi patches
- Use vCenter Server to manage higher availability and data protection

## Module 7: System & Network Design Case Study Prepare, Plan and Design an Enterprise Network

This course leads to the postgraduate certification. It is necessary to have completed NM03, NM04 or NM05, totalling 30 or more ects (including this course).

<b>Code:</b> NM07 <b>Level:</b> Postgraduate <b>ECTS:</b> 8 <b>Lab Work:</b> 36 hours <b>Price:</b> 550	<b>Lab Room:</b> 5306 <b>Day:</b> Thursday <b>Time:</b> 18-21 <b>Semester:</b> 1 - (2) <b>Prerequisite:</b> NM03 or higher
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You will select a relevant ICT Architecture and Network Management project and will be coached by one of our professional instructors.

### Course Dates

Here is the general schedule for the different course modules in the postgraduate programs **ICT Infrastructure & Network Management**.

Code	Course Module	Lab Room	Day	Time	Semester
NM01	<b>Interconnecting Network Devices 1*</b>	5306	Monday or Wednesday	18-21	1 - (2)
NM02	<b>Interconnecting Network Devices 2*</b>	5306	Monday or Wednesday	18-21	(1) - 2
NM03	<b>Network Security*</b>	5306	Thursday	16-19	1 - (2)
NM04	<b>Advanced Switching*</b>	5306	Wednesday or Thursday	18-21	(1) - 2
NM05	<b>Advanced Routing*</b>	5306	Wednesday or Thursday	18-21	1 - (2)
NM06	<b>System Virtualization*</b>	5306	Tuesday	16-19	1 - (2)
NM07	<b>System &amp; Network Design Case Study</b>	5306	Thursday	18-21	(1) - 2

\* Every module requires you to take **36 hours** of lab work and a lot of time devoted to learning, planning and designing. Modules marked with an asterisk (\*) are optional. The only requirement is that you finalize three modules according to the dependency rules in order to be allowed to hand in a case study.



## Prerequisites

This postgraduate programme is open to every candidate with a degree in higher education (graduate, bachelor, master) or to students in their final year of higher education. An official postgraduate certificate issued by HUB University College will only be granted to those students who have a degree of higher education at the minimum. Others will receive a certificate of participation.

## Cost

The basic cost of one course module is **550 euro**, but you can get substantial **discounts** according to the examples in the payment plans below. Also you are able to get training vouchers from the government.

Code	Course Module	Level	ECTS	Price
NM01	<b>Interconnecting Network Devices 1*</b>	CCNA	8	550
NM02	<b>Interconnecting Network Devices 2*</b>	CCNA	8	550
NM03	<b>Network Security*</b>	CCNA	8	550
NM04	<b>Advanced Switching*</b>	CCNP	10	550
NM05	<b>Advanced Routing*</b>	CCNP	10	550
NM06	<b>System Virtualization*</b>	VCP	8	550
NM07	<b>System &amp; Network Design Case Study</b>	PG	8	250

(1) In order to obtain a postgraduate degree in ICT Network Management & Organisation you need to acquire at least **30 ects** including a case study (paper). For every extra module taken you will receive a specific certificate.

(2) Every module on average takes minimally 36 hours of lab work during one semester. The modules are organised in a **blended learning** format. The labs are organized in an **open learning center** setup.

(3) You can work one to four evenings (3 to 12 hours) in the lab each week, depending on the availability. In the case you cannot finish a module during a specific semester, you are allowed to continue during maximum one subsequent semester.

(4) The normal fee per course module is 550 euro. This includes: on-line course materials, coaching, access to labs containing more than 50 routers and switches.

Payments can be made per semester or annually.

- **4A** If you enroll and pay for two modules at once, you will receive a 20% discount on the total amount of the payment.
- **4B** If you enroll and pay for three or more modules at once, you will receive a 25% discount on the total amount of the payment.

(5) Access to the labs is possible every regular semester week from Monday till Thursday. It is possible to change the day of the week upon request and depending upon the availability. You can take more than one module during one semester, depending on the availability.

- **5A** For every additional module in one semester you get a 25% discount. For determining the price the modules are sorted according to the course code.
- **5B** The first module you take during a semester will be at the normal list price.

(6) All Prices are exclusive of 21% VAT

Modules can be started in either semester, but are only organised when a sufficient number of participants are enrolled. NM06 will be planned once a year.

#### Students who enrolled for a postgraduate degree in 2013-2014

Students who enrolled for a postgraduate degree in 2013-2014 are allowed to finish the course according to the existing conditions.

## PAYMENT PLANS

It is possible to receive substantial discounts between 20 and 45%, if you enroll for more than one course during one semester. Here are six types of payment plans. In every example the NM07 is included, because it is a mandatory module in order to obtain the postgraduate certificate.

<b>PLAN 1</b>	<b>You enroll for four modules (one per semester) and pay every year</b>				
	<b>Semester 1</b>	<b>Normal price</b>	<b>Payment</b>	<b>Discount</b>	<b>Rule</b>
	NM01	550	550		5B
	<b>Semester 2</b>				
	NM02	550	550		5B
	Total amount Year 1		<b>1,100</b>		
	If you pay at once		<b>880</b>	<b>-220</b>	4A -20%
	<b>Semester 3</b>				
	NM03	550	550		5B
	<b>Semester 4</b>				
	NM07	250	250		5B
	Total amount Year 2		<b>800</b>		
	If you pay at once		<b>640</b>	<b>-160</b>	4A -20%
<b>PLAN 2</b>	<b>You enroll for four modules (one per semester) and pay all modules at once</b>				
	<b>Semester 1</b>	<b>Normal price</b>	<b>Payment</b>	<b>Discount</b>	<b>Rule</b>
	NM01	550	550		5B
	<b>Semester 2</b>				
	NM02	550	550		5B
	<b>Semester 3</b>				
	NM03	550	550		5B
	<b>Semester 4</b>				

	NM07	250	250		5B
	Total amount Year 1+2		<b>1,900</b>		
	If you pay at once		<b>1,425</b>	<b>-475</b>	4B -25%
<b>PLAN 3</b>	<b>You enroll for four modules (two per semester) and pay all modules at once</b>				
	<b>Semester 1</b>	<b>Normal price</b>	<b>Payment</b>	<b>Discount</b>	<b>Rule</b>
	NM03	550	550		5B
	NM04	550	413		5A - 25%
	<b>Semester 2</b>				
	NM05	550	550		5B
	NM07	250	188		5A - 25%
	Total amount	<b>1,900</b>	<b>1,700</b>		
	If you pay at once		<b>1,275</b>	<b>-625</b>	4B -25%
<b>PLAN 4</b>	<b>You enroll for four modules (all in one semester) and pay all modules at once</b>				
	<b>Semester 1</b>	<b>Normal price</b>	<b>Payment</b>	<b>Discount</b>	<b>Rule</b>
	NM03	550	550		5B
	NM04	550	413		5A - 25%
	NM05	550	413		5A - 25%
	NM07	250	188		5A - 25%
	Total amount	<b>1,900</b>	<b>1,563</b>		
	If you pay at once		<b>1,172</b>	<b>-728</b>	4B -25%
<b>PLAN 5</b>	<b>You enroll for six modules (three per semester) and pay all modules per semester</b>				
	<b>Semester 1</b>	<b>Normal price</b>	<b>Payment</b>	<b>Discount</b>	<b>Rule</b>
	NM02	550	550		5B
	NM03	550	413		5A - 25%
	NM04	550	413		5A - 25%
	Total amount Semester 1	<b>1,650</b>	<b>1,375</b>		
	If you pay at once		<b>1,031</b>	<b>-619</b>	4B -25%
	<b>Semester 2</b>				
	NM05	550	550		5B
	NM06	550	413		5A - 25%
	NM07	250	188		5A - 25%
	Total amount Semester 2	<b>1,350</b>	<b>1,150</b>		
	If you pay at once		<b>863</b>	<b>-488</b>	4B -25%

## **Educational Leave**

Students may apply for educational leave. Our administration will prepare the necessary documents upon request.

## **Training Vouchers (250 euro)**

HUB-KAHO is recognized as an official training centre by the Flemish Community in Belgium. Hence companies located in the Flemish region can apply for the training vouchers issued by the Flemish authorities.

Individuals who live in Brussels or in the Flemish region can apply for the VDAB training vouchers (max. 250 euro).

More info: <http://vdab.be/opleidingscheques/werknemers.html>

## **Enrollment**

Send your application form to  
HUB - GPV Permanente Vorming - Warmoesberg 26 - 1000 Brussel  
Email: [gpv@hubbrussel.be](mailto:gpv@hubbrussel.be)

## **Contact information**

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