






5 credits

30.0 h + 30.0 h

Q1

Teacher(s)	Lugan Sébastien (compensates Macq Benoît) ;Macq Benoît ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<ul style="list-style-type: none"> <li>• Introduction, media access control, layered models,</li> <li>• Internet Protocol, IP routing, introduction to IPv6,</li> <li>• DNS, e-mail, common protocols,</li> <li>• Multimedia networking (streaming, VoIP, DVB),</li> <li>• Network security and advanced topics.</li> </ul>
Aims	<p>With respect to the AA referring system defined for the Master in Electrical Engineering, the course contributes to the development mastery and assessment of the following skills :</p> <ul style="list-style-type: none"> <li>• AA1.1, AA1.2, AA1.3</li> <li>• AA2.1, AA2.3, AA2.4</li> <li>• AA5.1, AA5.2, AA5.3, AA5.5.</li> </ul> <p>At the end of this course, the students will be able to</p> <ol style="list-style-type: none"> <li>1                     <ul style="list-style-type: none"> <li>• understand the architecture of communication networks,</li> <li>• identify the routing strategies which are best suited to a particular network topology,</li> <li>• understand resource management strategies allowing to guarantee a quality of service, particularly for multimedia communications,</li> <li>• design architectures allowing secure communications.</li> </ul> </li> </ol> <p>Transverse learning outcomes :</p> <ul style="list-style-type: none"> <li>• use a network simulation tool (Netkit),</li> <li>• configure network parameters of a Linux based system using low-level commands,</li> <li>• configure a router using a (Cisco) IOS-like syntax</li> </ul> <p>-----</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Evaluation methods	<ul style="list-style-type: none"> <li>- Lab report (20% of the final points),</li> <li>- Written exam (80% of the final points)</li> </ul>
Teaching methods	<ul style="list-style-type: none"> <li>- Traditional lectures,</li> <li>- Labs in computer room allowing the student to use the theoretical concepts seen during the lecture on a simulated network (using Netkit simulation software).</li> </ul>
Content	<p>Part 1 (networking):</p> <ul style="list-style-type: none"> <li>• Introduction to communication networks,</li> <li>• Media Access Control, Layered models,</li> <li>• Internet Protocol, IP fragmentation,</li> <li>• UDP, TCP, ICMP, traceroute &amp; PMTU discovery,</li> <li>• Static IP routing, dynamic routing (algorithms and protocols),</li> <li>• DNS, e-mail (SMTP, POP3, IMAP4),</li> <li>• common protocols (HTTP, FTP, etc.),</li> <li>• NAT, introduction to IPv6,</li> <li>• wireless network protocols (3G/4G/5G, Wifi, BlueTooth, BLE),</li> <li>• wearable devices, IoT &amp; smart sensors (Zigbee, NFC, Lora, Sigfox).</li> </ul> <p>Part 2 (multimedia/security):</p> <ul style="list-style-type: none"> <li>• Introduction to multimedia networking,</li> <li>• Multimedia streaming (stored multimedia, live, real-time interactive),</li> <li>• Introduction to audio and video compression,</li> <li>• Streaming protocols,</li> <li>• VoIP (ToIP, video conferencing, SIP),</li> <li>• Digital Video Broadcasting (DVB),</li> <li>• Introduction to network security, principles of cryptography,</li> </ul>

	<ul style="list-style-type: none"><li>• Message integrity, digital signature, certification authorities, PKI,</li><li>• Secure e-mail and network connections (X.509, SSL).</li></ul>
Inline resources	Moodle : <a href="http://moodleucl.uclouvain.be/course/view.php?id=5733">http://moodleucl.uclouvain.be/course/view.php?id=5733</a>
Bibliography	- Notes de cours, - James Kurose and Keith Ross, «Computer Networking, A Top-Down Approach Featuring the Internet».
Other infos	Labs in computer room
Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electro-mechanical Engineering	<a href="#">ELME2M</a>	5		
Master [120] in Electrical Engineering	<a href="#">ELEC2M</a>	5		
Master [120] in Agricultural Bioengineering	<a href="#">BIRA2M</a>	5		
Master [120] in Chemistry and Bioindustries	<a href="#">BIRC2M</a>	5		
Master [120] in Environmental Bioengineering	<a href="#">BIRE2M</a>	5		
Master [120] in Forests and Natural Areas Engineering	<a href="#">BIRF2M</a>	5		