






5.00 credits

30.0 h + 15.0 h

Q1

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

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| | <ul style="list-style-type: none"> • Secure e-mail and network connections (X.509, SSL). |
| Inline resources | Moodle : http://moodleucl.uclouvain.be/course/view.php?id=5733 |
| Bibliography | <ul style="list-style-type: none"> - 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) | | | | |
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| Program title | Acronym | Credits | Prerequisite | Learning outcomes |
| Master [120] in Agricultural Bioengineering | BIRA2M | 5 | |  |
| Master [120] in Electrical Engineering | ELEC2M | 5 | |  |
| Master [120] in Environmental Bioengineering | BIRE2M | 5 | |  |
| Master [120] in Electro-mechanical Engineering | ELME2M | 5 | |  |
| Master [120] in Chemistry and Bioindustries | BIRC2M | 5 | |  |