

Common Module **Computer Networks** Module Description

Countries	Institutions	Common Module	ECTS
Romania Poland Greece France Bulgaria	Military Technical Academy "Ferdinand I" Military University of Technology Hellenic Air Force Academy French Air Force Academy "Vasil Levski" National Military University	<b>Computer Networks</b> <i>European Common Technical</i> <i>Semester for Defence and Security</i>	3.0

Service	Minimum Qualification of Instructors
Technical/ALL	Officers or civilian Lecturers:
Language English	<ul> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or min. NATO STANAG 6001 Level 3.</li> <li>Expertise in relevant topics.</li> <li>Relevant academic publications.</li> </ul>

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#### **Prerequisites for international** participants

- English: Common European • Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2.
- At least 1 year of national (military) higher education.
- Basic knowledge in technical systems for security and defence

## **Goal of the Module**

- Discover and understand reference network models and hierarchical layers.
- Learn about computer network network topologies, architectures, digital data transfer, packets, protocols and network processes.
- Development of individual skills for basic network device configuration. · Providing students with basic knowledge of computer networks in the field of use, configuration, design and programming of local and wide area networks and learning about the technical solutions used in these networks.
- Developing skills of students in solving simple problems • arising at using and configuring computer networks.

Learning outcomes	Know- ledge	<ul> <li>Explainthe structures and functions of computer communication components, the computer communication protocols, the role, interaction and operation of the components of communication systems.</li> <li>Identify the security implications regarding planning, deployment and operation of network equipment and services.</li> </ul>
	Skills	<ul> <li>Use of tools for analysis and testing communication protocols.</li> <li>Design a connection diagram to connect and configure selected elements of the computer network using appropriate methods, techniques and tools by the given specification.</li> </ul>
	Respon- sibility and autonomy	<ul><li>Analyze the properties of network components and systems.</li><li>Estimate the need and goal of using computer networks in practical applications.</li></ul>

### Verification of learning outcomes:

- Observation: Throughout the Module students will meet with the systems applications, and they will • discuss the given topics in the plenary and present teamwork results. During this workshop, students will be evaluated to verify their competencies.
- **Project**: Teamwork project and project defence.
- Test: Final examination at the end of the module.

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Module details				
Main Topic	Recom- mended WH	Details		
OSI Model for computer	8	Lection: 4 h. Principles of open system network models - layers and protocols. Network applications and services – dns, http (https), email, ssh, rdp.		
networks. Application layer		Lab exercise (practice): 4 h. Network building and interconnection with simulation software.		
Transport layer	8	Lection: 4 h. Transport-layer services in computer networks. Connectionless transport with UDP. Connection-oriented transport with TCP. Header fields. Network congestion control. Lab exercise (practice): 4 h.		
		TCP segments and UDP datagrams inspection in a computer network. Usage of simulation software and/or Wireshark.		
Network layer	8	Lection: 4 h. Logical addresses in computer networks. Internet Protocol version 4 (IPv4). Header fields. IPv4 Addressing. Internet Protocol version 6 (IPv6). Header fields. IPv4 Addressing. Static-routing configuration.		
		Classful and classless IPv4 address space calculation. IPv4 and IPv6 packets inspection with simulation software and/or Wireshark.		
Data-Link layer	8	Lection: 4 h. Data-link layer protocols. Ethernet frame structure. MPLS service. MAC addresses and switch CAM (MAC) tables.		
		LAD exercise (practice): 4 n. LAN frames switching inspection with simulation software and/or hardware devices.		
Computer networks physical	8	Lection: 4 h. Computer network cabling and interface connectors – UTP; STP (Foiled TP) with RJ-45; fiber-optics (SFP, GBIC, SC, LC, MU). Wireless LAN standard (IEEE802.11). Cellular internet access (HSPA, LTE).		
layer		Lab exercise (practice): 4 h. Cabling a computer network. Building a small network. Computer network and services inspection with simulation software or by means of hardware devices.		
Final Exam	2	Theoretical test – 1 h. Practical exam (group project) – 1 h.		
Total WH	42			
Additional hours (WH) to increase the learning outcomes				
Self-Studies and syndicate work	33	<ul> <li>Specific online RFC documents.</li> <li>Individual preparation for the group project;</li> <li>Team work for the group project;</li> <li>Simulation software self-study.</li> </ul>		
Total WH	75			

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# List of Abbreviations:

B1, B2	CEFR Levels
CEFR	Common European Framework of Reference for Languages
ECTS	European Credit Transfer and Accumulation System
WH	Working Hour

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