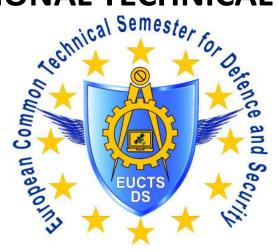




## INTERNATIONAL TECHNICAL SEMESTER



# EUROPEAN COMMON TECHNICAL SEMESTER FOR DEFENCE AND SECURITY (E<sub>u</sub>CTS<sub>DS</sub>)

Modules description









No.	Code	Code DISCIPLINES -		Didactic activities				Individual	ECTS
				S	L	P	Total	study	ECIS
1.	MS-01	Common Security and Defence Policy	14	28	0	0	42	33	3
2.	MS-02	Integrated Weapon Systems	14	0	28	0	42	33	3
3.	BE-01	Applied Informatics	14	0	28	0	42	33	3
4.	BE-02	Applied Automation for Engineering Systems	14	0	28	0	42	33	3
5.	EI-01 MA-01	A. Signal Processing B. Mechanics and Material Science	14	0	28	0	42	33	3
6.	EI-02 MA-02	A. Programming Languages B. Dynamic of Flight	14	0	28	0	42	33	3
7.	EI-03 MA-04	A. Computer Networks B. Propulsion Systems	14	0	28	0	42	33	3
8.	EI-04 MA-04	A. Microcontrollers B. Computer-Aided-Design and Numerical Analysis	14	0	28	0	42	33	3
9.	Proj	Interdisciplinary Scientific Project	0	0	0	84	84	66	6
10.	ICom	Intercultural communication*	14	14	0	0	28	22	2
11 Sport Physical Education and Sports*		0	0	28	0	28	22	2	
TOTAL				42	224	84	476	374	34









## **Common Security and Defence Policy** (CSDP)

Module Description



Implementation Group Doc.: EuCTSds/ MS-01

Date: 30 09 2025 Origin: **RO MTA** 

Countries LoD-13

**European Common Technical Semester for Defence and Security** 

Common Security and **Defence Policy (CSDP)**  **ECTS** 3.0

Service	Minimum Qualification for Lecturers			
Technical/ ALL	<ul> <li>Officers:</li> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG Level 3,</li> <li>Relevant expertise on CSDP,</li> <li>International experience.</li> </ul>			
Language	• Civilians:			
English	<ul> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG Level 3,</li> <li>Expertise on relevant topics,</li> </ul>			
	<ul> <li>Relevant academic publications.</li> </ul>			
SQF MILOF	<ul> <li>Competence area - International Security/Diplomacy Actor</li> <li>Learning area - International organisations</li> </ul>			
201	Organisation level - Single Arm/Branch			

### Prerequisites for international participants

- English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2.
- At least 2 years of national (military) education.
- Basic knowledge of International Politics and Relations, EU, CFSP, CSDP. It could be obtained via ESDC Internet Distance Learning.

## Aim of the Module

To know the role of different international organisations with implications for security, defence, and conflict management by revealing the interdependencies among major international organisations.

iing outcomes	Know- ledge	Explain the international relations theory  • Express interdependencies among international governmental and non-governmental organisations, independent agencies and strategic partners around the world.			
	Skills	Contextualise the military instruments within the national and global security environment in an unpredictable international environment			
Learning	Respon- sibility and autonomy	Take decisions and implement relevant actions necessary to promote an environment conducive to promoting the objectives and principles of international cooperation.			

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of CSDP (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).

Page 1 of 3	
Previous version revised by Col Assoc. Prof. GELL, PhD / IG-Chairman	29 November 2015
New version drafted by Lt Col SPINELLO / Chairman of LoD 8	31 January 2021
Revised by Col Assoc. Prof. GELL, PhD / IG-Chairman	21 February 2021
Revised according to SQF MILOF by CAPT (N) N. Dimitrov and Assoc. Prof. N. Karadimas / Chairpersons LoD 2/8	14 <sup>th</sup> of February 2024
Adapted to EuCTSds by COL (AF) Prof. Eng. Cristian-Emil MOLDOVEANU	30 <sup>th</sup> of September 2025







## **Common Security and Defence Policy** (CSDP) Module Description



Implementation Group EuCTSds/ MS-01 30 09 2025 RO MTA

Doc.: Date : Origin:

		<b>Module Details</b>		
Торіс	Resi- dential	Details		
The European Union	8	<ul><li>History</li><li>Institutional framework.</li><li>Pillar structures</li></ul>	Achievements     CFSP	
CSDP	8	Structures     European Security Strategy     Crisis management	<ul> <li>Decision-making process</li> <li>CSDP and the Lisbon Treaty</li> <li>Europeanisation of officer training</li> </ul>	
EU missions and operations	8	<ul><li>Comprehensive approach</li><li>Capabilities</li></ul>	Berlin+ agreement     Lessons learned	
EU and partners	4	• UN • NATO • OSCE • AU	ASEAN     Regional aspects and neighbourhood policy	
Horizontal issues	4	<ul><li>human rights</li><li>gender issues</li></ul>	legal aspects	
Recent CSDP initiative	6	<ul> <li>Permanent Structured Cooperation (PESCO)</li> <li>European Defence Fund (EDF)</li> <li>Military Planning and Conduct Capability (CPCC)</li> <li>Coordinated Annual Review on Defence (CARD)</li> <li>European Intervention Initiative (EI2)</li> </ul>		
Future develop- ments	4	<ul> <li>The changing scenario (multipolarism, unipolarism, bipolarism, no polarism)</li> <li>The new regionalism as a reaction to declining hegemony of superpowers</li> <li>EU strategic interest in the 21st Century</li> </ul>		
Total WH	42			
Add	litional hours	(WH) to increase the learning out	tcomes	
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge</li> </ul>		
Total WH	75 3 ECTS			

Page 2 of 3				
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Adapted to EuCTSds by COL (AF) Prof. Eng. Cristian-Emil MOLDOVEANU	30 <sup>th</sup> of September 2025			







## Common Security and Defence Policy (CSDP) Module Description

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Implementation Group
Doc.: EuCTSds/ MS-01
Date: 30 09 2025
Origin: RO MTA

Date : Origin:

## **List of Abbreviations:**

Association of South-East Asian Nations	ASEAN
Autonomous Knowledge Unit	AKU
African Union	AU
Common European Framework of Reference for Languages	CEFR
Common Foreign and Security Policy	CFSP
Common Module	CM
Common Security and Defence Policy	CSDP
European Credit Transfer and Accumulation System	
European Security Strategy	ESS
European Union	EU
European Union Global Strategy	EUGS
North Atlantic Treaty Organization	NATO
Standardization Agreement	
United Nations	
Working Hour	W/LI

Page 3 of 3				
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Revised according to SQF MILOF by CAPT (N) N. Dimitrov and Assoc. Prof. N. Karadimas / Chairpersons LoD 2/8	14 <sup>th</sup> of February 2024			
Adapted to EuCTSds by COL (AF) Prof. Eng. Cristian-Emil MOLDOVEANU	30th of September 2025			









## **Integrated Weapon Systems** Module Description



Implementation Group Doc.: EuCTSds/ MS-02 Date: 30 09 2025 **RO MTA** Origin:

Countries LoD-13

**European Technical Semester for Defence** and Security

Common Module **Integrated Weapon Systems** 

**ECTS** 3.0

Service	Minimum Qualification of Instructors			
Technical/	Officers or civilian Lecturers:			
ALL	<ul> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or</li> </ul>			
т	min. NATO STANAG 6001 Level 3.			
Language	<ul> <li>Teaching experience related to the topicp</li> </ul>			
English o International experience.				
	<ul> <li>Relevant academic publications.</li> </ul>			
SQF	Competence area - Military technician			
MILOF	• Learning area - Employment of weapon/operating platform/systems			
	Organisation level – Single Arm/Branch / Single Service			

### 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 of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic concepts of integrated weapon systems and military technology for defence and security.
- Integration, exploitation and analysis of the integrated weapon systems and military technology for defence and security.

ning outcomes	Know- ledge	<ul> <li>Describe the basic concept related to the mission configurations related to the technical systems.</li> <li>Identify and explain the main characteristics of armament, ammunition systems and military technology and damage mechanisms.</li> </ul>
	Skills	<ul> <li>Apply the weaponeering methods to elaborate a mission configuration.</li> <li>Design scenarios based on integrated weapon systems and military technology for defence and security to underline how the topics treated in the course are used within engineering activity.</li> </ul>
Lear	Responsibility and autonomy	<ul> <li>Assess the target vulnerability and analyse the effectiveness of selected weapon systems for specific targets subjects.</li> <li>Compare different scenarios based integrated weapon systems and military technology for defence and security.</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of integrated weapon systems and military technology for defence and security (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).









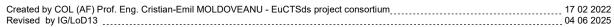
## **Integrated Weapon Systems** Module Description



Implementation Group

Doc.: Date : EuCTSds/ MS-02 30 09 2025 RO MTA Origin:

Module details					
The content is a		and depends on the course director's decision			
Main Topic	Recommended WH	Details			
Mission configurations/Military Leadership related to technical systems	6	Management of the modern battlefield by the commander. Transfer of knowledge and skills related to the basic technologies used on the battlefield by developed countries. The goal is to develop military management and leadership skills. Lecture (2h); Applications (4h).			
Security and defence technical systems characteristics (satellites, radar systems, electronic, communication and IT systems, aircraft, helicopters, UAVs, etc)	6	Transfer of knowledge in technical systems characterising modern military operations in the field. The substantive scope of education includes satellites, radar systems, electronic communication and IT systems, aircraft, helicopters, UAVs. The aim is to provide knowledge about the practical aspects of the discussed technical systems in the context of the modern battlefield. Lecture (2h); Applications (4h).			
Combat vehicles Characteristics	6	Characteristics of combat vehicles. The goal is to provide knowledge about selected types of technical systems, taking into account their specifications and the scale of destruction Lecture (2h); Applications (4h).			
Armament and Ammunition System Characteristics and Damage Mechanisms	6	Characteristics of selected armaments and ammunition, taking into account the impact of these armaments and ammunition on selected targets. Description of the destruction process resulting from the use of different types of weapons and ammunition. The goal is to provide knowledge about selected types of ammunition and weapons, taking into account their specifications and the scale of destruction. Lecture (2h); Applications (4h).			
Armament and Ammunition Systems. Blast and Ballistics/Explosive Engineering	6	Armament and Ammunition Systems characteristics including the modern battlefield conditions. Description of using selected armament and ammunition systems during military operations in specific climatic conditions. Characteristics of selected blast and ballistics technologies due to the modern battlefield conditions. The goal is to provide knowledge of specification of selected armament ammunition systems. Lecture (2h); Applications (4h).			
Target vulnerability assessment, weapon selection and effectiveness evaluation of selected weapon systems for specific targets (Weaponeering)	6	Transfer of knowledge in the field of target vulnerability assessment, weapon selection and effectiveness evaluation of selected weapon systems for specific targets. The substantive scope of the subject of education includes selected weapon systems for specific targets (Weaponizing). The aim is to provide knowledge about these weapons including technical aspects of using these items in specific conditions of modern battlefield. Lecture (2h); Applications (4h).			
Aircraft armament&missiles technology & army armament and ordnance	6	Characteristics of selected aircraft armament&missiles technology as well as army armament and ordnance. Description of the methodology of using selected technologies due to modern battlefield conditions. The goal is to provide knowledge of specification of selected aircraft armament&missiles technologies and army armament. Lecture (2h); Applications (4h).			
Total WH	30 12				











## **Integrated Weapon Systems** Module Description



Implementation Group Doc.: Date : EuCTSds/ MS-02 30 09 2025 Origin: RO MTA

Additional hours (WH) to increase the learning outcomes					
Self-Studies and syndicate work 33		<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>			
Total WH	75 3 ECTS				

	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







LoD-13



## **Applied Informatics** Module Description

**Defence and Security** 



Implementation Group Doc.: EuCTSds/ BE-01 Date: 30 09 2025 Origin:

and Defence College Countries **European Common Technical Semester for** 

Common Module **Applied Informatics**  **ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or
Language	min. NATO STANAG 6001 Level 3.
Language	<ul> <li>Teaching experience related to the topic</li> </ul>
English	<ul> <li>International experience.</li> </ul>
	<ul> <li>Relevant academic publications.</li> </ul>

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic concepts of programming language techniques for defence and security technology applications.
- Computer-based problem-solving methods applied in defence and security technology systems.

outcomes	Know- ledge	<ul> <li>Demonstrate understanding of fundamental programming language concepts relevant to defence and security technology.</li> <li>Identify and explain basic algorithms and programming techniques used in defence and security system applications.</li> </ul>	
earning oute	Skills	<ul> <li>Design, develop, and debug simple programs to model and simulate defence and security-related scenarios.</li> <li>Apply appropriate algorithms and programming methods to solve practical problems in defence and security technology.</li> </ul>	
Le	Respon- sibility and autonomy	<ul> <li>Evaluate and improve software performance in defence and security contexts.</li> <li>Analyse and check the correctness and quality of the algorithms and computer codes.</li> </ul>	

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of programming languages applied in defence and security technology applications (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).









## **Applied Informatics**Module Description

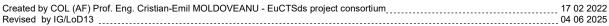


Implementation Group
Doc.: EuCTSds/ BE-01
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director's decision Recommended **Main Topic Details** WH Lecture (2h): - Data types. The concept of variables and declarations in programming languages. Basic of programming - Functions and libraries. User-defined functions. languages Applications (2h): - Mathematical operations with arrays, vectors, and matrices. Lecture (2h): - Concept, classification, and methods of description of algorithms. Controlling the flow of information in the algorithm. - Principle of recursive processing and constructing an algorithm: main segment and subroutines. of Algorithmization data processing tasks Applications (2h): - Iterative algorithms: Iterative algorithms: Program loop: loops with and without a counter. Iterative processing principle. Checking the correctness of the algorithm: tree of consecutive calls and returns, using the stack properties. Lecture (2h): - Plotting in two dimensions and three dimensions. Graphical representation **Applications (2h):** data - GUI design. Lecture (4h): - Initial value problem. Runge-Kutta method. - Solving ODE with MATLAB. Numerical Integration **Ordinary Differential Equations** 12 Applications (8h): with MATLAB - Solving a second order ODE. - Modelling of Bullet Trajectory. Lecture (2h): - Solving ODE with SIMULINK. Numerical Integration - Solving a second order ODE. **Ordinary Differential Equations** 10 Applications (8h) with SIMULINK - Modelling of Bullet Trajectory. Lecture (2h): - Structural analysis with MATLAB. Using specific **MATLAB** 8 **Applications (6h):** toolboxes - Structural analysis with MATLAB. **Total WH** 42

Page 2 of 3

Additional hours (WH) to increase the learning outcomes











## **Applied Informatics** Module Description



Implementation Group Doc.: Date : EuCTSds/ BE-01 30 09 2025 RO MTA Origin:

Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge</li> </ul>
Total WH	75 3 ECTS	

List of Abbreviations:		
CEFR Levels	B1, B2	
Common European Framework of Reference for Languages	CEFR	
European Credit Transfer and Accumulation System	ECTS	
Graphical User Interface	GUI	
Ordinary Differential Equations	ODE	
Working Hour	WH	







and Defence College

## Erasmus+ **Applied Automation of Engineering Systems**

Module Description



Implementation Group Doc.: EuCTSds/ BE-02 30 09 2025 Date: Origin:

Countries LoD-13

**European Common Technical Semester for Defence and Security** 

Common Module **Applied Automation of Engineering Systems** 

**ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or
T	min. NATO STANAG 6001 Level 3.
Language	Teaching experience related to the topic
English	o International experience.
	Relevant academic publications.

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Mathematical analysis of linear control systems, stability assessments, control quality, synthesis methods and correction of automation systems' dynamic applied in robotic systems.
- Practical matters regarding control and robotics systems.

outcomes	Know- ledge	<ul> <li>Explain the main concepts of automation and control theory applied in engineering systems.</li> <li>Identify the main methods for modelling robotic stations, for programming robots and designing and controlling them.</li> </ul>
earning oute	Skills	<ul> <li>Measure the properties of control systems and robots, conducting time and frequency analysis.</li> <li>Design, model and simulate practical control systems and robotic stations, using engineering programming software (environments).</li> </ul>
Le	Respon- sibility and autonomy	<ul> <li>Analyse the control systems and robotics devices in manufacturing processes.</li> <li>Estimate the need and goal of using automation and robotics systems in practical applications.</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of applied automation of engineering systems (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







## Erasmus+

## **Applied Automation of Engineering Systems**

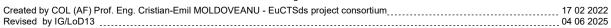
Module Description



Implementation Group Doc.: Date : EuCTSds/ BE-02 30 09 2025 RO MTA

Origin:

Module details			
The content is as	an example and	d depends on the course director's decision	
Main Topic	Recommended WH	Details	
Mathematical Models of Automation Systems	6	Creating linear models of control systems such as the transfer-function model, frequency model, state-space model, time and frequency characteristics, characteristics of fundamental dynamic elements, and block diagrams. The classes aim to model, design and simulate some control systems in MATLAB software.  • Lecture (2h):  - The mathematical description, design, and analysis of automation systems.  • Applications (4h):  - Designing and simulation of some control systems using MATLAB software with specialised toolboxes.	
Design the Controller and Synthesis of the Automation Control Systems	6	The types, characteristics, and parameters of the classical controllers. Ziegler-Nichols controller design method. Root locus design method. The classes aim to model, design, and simulate some control systems in MATLAB software.  • Lecture (2h):  - The design and synthesis issues of the controller in control systems.  • Applications (4h):  - The simulation and analysis of some control systems with various controllers using MATLAB software.	
Modelling, Control Design and Experiment of 2 DOF/3 DOF Helicopter	6	Modelling, designing and testing helicopter models mounted on a fixed base with two propellers driven by DC motors. During the model movement, all rotation angles are measured by high-resolution encoders. Laboratories are done by using a graphical programming environment and real-time embedded controllers.  • Lecture (2h):  - The modelling and design of control systems of the helicopter model.  • Applications (4h):  - The laboratory research of the 2 DOF Helicopter model with controller  - The laboratory research of the 3 DOF Helicopter model with controller	
Modelling, Control Design and Experiment of Inverted Pendulum/ Rotary Double Inverted Pendulum	6	Modelling, designing, and implementing a state-feedback control system that will balance the pendulum in the upright vertical position to a commanded rotary arm angle. Laboratories are done by using a graphical programming environment and real-time embedded controllers.  • Lecture (2h):  - The modelling and design of a state-feedback control system of the inverted pendulum.  • Applications (4h):  - The experimental research on the inverted pendulum.  - The experimental research on the rotary double inverted pendulum.	











## **Applied Automation of Engineering Systems**

Implementation Group Doc.: Date : EuCTSds/ BE-02 30 09 2025 RO MTA Origin:

Module Description

Introduction to manipulators and robot systems (construction and control)	6	Presentation of the construction of selected types of manipulators, controllers, and control panels. Configuration of the robot system. Presentation of the robot control methodology.  • Lecture (2h): - The design, model, and simulate robotic stations.  • Applications (4h): - The experimental research on selected manipulators and robot systems.
Environments for offline programming of robots	6	Overview of selected environments for offline programming of robots. Acquainting the methodology of offline robot programming. Configuration of the robot system in offline mode. Programming the manipulator movement for a selected task in a virtual environment. Conducting a simulation and analysis of the implemented process.  • Lecture (2h):  - The overview of environments for robots offline programming.  • Applications (4h):  - Programming the manipulator movement for an appointed task in a virtual environment.  - The experimental research on selected manipulators.
Selected online robot control systems	6	Overview of selected online robot control systems. Acquainting the methodology of online robot programming. Configuration of the robot system in online mode. Programming the manipulator movement for a selected task in a real environment. Running a real robot and analysing the process being carried out.  • Lecture (2h):  - The overview of environments for robots online programming.  • Applications (4h):  - Programming the manipulator movement for a selected task in a virtual environment.  - The experimental research on selected manipulators.
Total WH	42	
Additional hours (WH) to increase the learning outcomes		
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>
Total WH	75 3 ECTS	









## **Applied Automation of Engineering Systems**



Implementation Group EuCTSds/ BE-02 30 09 2025 RO MTA Doc.: Date: Origin:

Module Description

## **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









## Module Description



Implementation Group Doc.: EuCTSds/ EI-01 Date: 30 09 2025 Origin:

Countries
LoD-13

**European Common Technical Semester for Defence and Security** 

Common Module **Signal Processing**  **ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	<ul> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or</li> </ul>
Lamana	min. NATO STANAG 6001 Level 3.
Language	<ul> <li>Teaching experience related to the topic</li> </ul>
English	<ul> <li>International experience</li> </ul>
o o	<ul> <li>Relevant academic publications.</li> </ul>

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic principles of signals & systems, as well as of signal processing.
- Signals & systems and signal-processing techniques: basic techniques of time-/frequency-domain processing.
- Practical applications of radars, telecommunications, image processing and pattern recognition.

nes	Know- ledge	<ul> <li>Master the different steps of sampling, digitalisation and reconstruction of signals.</li> <li>Explain how to synthesise an analogue/digital filter and to apply techniques for denoising.</li> </ul>
carning outcomes	Skills	<ul> <li>Perform spectral analysis, filtering of digital signals using analytical methods and numerical/simulation tools, calculate and analyse the spectrum and power/energy spectral density of a signal</li> <li>Design, model and simulate practical control systems and robotic stations, using engineering programming software (environments).</li> </ul>
Le	Respon- sibility and autonomy	<ul> <li>Analyse the digital signal processing concepts and methods.</li> <li>Assess the digital filter with specific characteristics</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of signal processing (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







Module Description



Implementation Group
Doc.: EuCTSds/ EI-01
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director decision Recommended Main Topic **Details** WH Lectures (2h) - Mathematical modeling of continuous and numerical signals. Elementary signals. Representation of continuous and numerical signals. Properties and characteristics. Introduction to the study Exercises/Labs (4h) 6 of signals - Graphical representations. Operations with elementary signals. - Generation and visualization of periodic and non-periodic signals using dedicated programming environments and laboratory equipment. Teamwork for group project. Lectures (2h) - CTFT and Inverse CTFT. DTFT and Inverse DTFT. CTFT and DTFT requirements and properties, common CTFT and **Continuous-Time** and DTFT pairs, frequency response of LTI systems, filters. Discrete-Time **Fourier** 6 Transform (CTFT Exercises/Labs (4h) DTFT) - Computations of CTFT and DFTF. Applications of CTFT and DTFT for spectral analysis of signals and systems - LTI filters and applications. Teamwork for group project. Lectures (2h) - From DTFT to DFT, DFT and Inverse DFT, DTFT requirements and properties, the FFT idea, FFT implementations. Discrete Fourier Transform (DFT) and Exercises/Labs (6h) 8 Fast Fourier Transform - Computations of DFT. Applications of DFT for spectral (FFT) analysis of signals and systems. - FFT decimation in time/frequency. FFT implementations. Spectral leakage and windowing. FFT applications. Teamwork for group project. Lectures (2h) - Shannon/Nyquist theory, signal sampling, sampling theorem, signal reconstruction, aliasing phenomena and Sampling and anti-aliasing filters, practical sampling and reconstruction. 6 Reconstruction Exercises/Labs (4h) - Practical sampling and reconstruction. Anti-aliasing filters. Teamwork for group project. Lectures (4h) - ZT pairs, relation between ZT and DTFT, ZT of common DT sequences, ZT requirements and properties, ZT applications,

Page 2 of 3

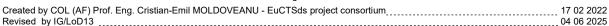
digital filters and applications.

- ZT applications. FIR/IIR digital filters. Teamwork for group

- Case studies of signal processing in civil and military

contexts. Specific applications. Integration of artificial intelligence and Internet of Things in signal processing

Exercises/Labs (6h)



project. Lectures (2h)

10

6



of

signal

Z-Transform (ZT)

**Applications** 

processing









Implementation Group Doc.: EuCTSds/ EI-01 30 09 2025 Date: Origin:

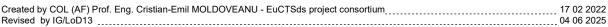
			Exercises/Labs (4h) - Signal processing-based systems analysis. Simulation of application systems encountered in real life. Teamwork for group project.
Total WH	42		
Add	litional h	ours (WH	() to increase the learning outcomes
Self-Studies and syndicate work		33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>
Total WH		75 CTS	•

## **BIBLIOGRAPHY:**

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- Steven W. Smith, Digital Signal Processing [2nd Edition], 1999.
- S. K. Mitra, Digital Signal Processing A Computer Based Aproach [2nd Edition], McGraw Hill, 2001.
- B. Girod, R. Rabenstein, and A. Stenger, Signals and Systems, Wiley, 2001.
- T. S. ElAli, Discrete Systems and Digital Signal Processing with MATLAB, CRC Press, 2005.
- A. Palamides and A. Veloni, Signals and Systems Laboratory with Matlab, CRC Press, 2011.
- M. J. Roberts, Signals and Systems Analysis Using Transform Methods and MATLAB [2nd Edition], McGraw Hill, 2012.
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- O. Alkin, Signals and Systems A Matlab Integrated Approach, CRC Press, 2014. □ L. F. Chaparro, Signals and Systems Using Matlab [2nd Edition], Elsevier, 2015.
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- Schaum's Outline of Digital Signal Processing [2nd Edition], McGraw Hill, 2011. Schaum's Outlines of Theory and Problems of Signals and Systems [4th Edition], McGraw Hill, 2019

## **List of Abbreviations:** B1, B2 \_\_\_\_\_ CEFR Levels CEFR Common European Framework of Reference for Languages ECTS \_\_\_\_\_ European Credit Transfer and Accumulation System DSP Digital Signal Processing WH Working Hour













## **Programming languages** Module Description



Implementation Group Doc.: EuCTSds/ EI-02 Date: 30 09 2025 Origin:

Countries LoD-13

## **European Technical Semester for Defence** and Security

Common Module **Programming languages**  **ECTS** 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>

## 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.
- At least a basic programming course, preferably C/C++.
- Basic knowledge in technical systems for security and defence

## Goal of the Module

- Discover and understand the C programming language
- Concepts and constructions across programming languages (C, C++, Python).
- Computer-based problem-solving methods applied in defence and security technology systems.

mes	Know- ledge	<ul> <li>Describe the basic concept of programming languages applied in defence and security technology applications.</li> <li>Identify the main algorithms and programming language techniques used to solve the basic applications in defence and security technology systems.</li> </ul>	
Learning outcomes	Skills	<ul> <li>Design, implement and debug simple programs for modelling and simulation basic defence and security phenomena.</li> <li>Apply programming languages algorithms to solve basic defence and securit technology applications.</li> </ul>	
Leal	Responsibi lity and autonomy	<ul> <li>Analyse and check the correctness and quality of the algorithms and computer codes.</li> <li>Compare different programming language techniques to better solve applications in the defence and security technology field.</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.



Revised by IG/LoD13





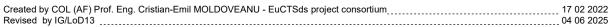


## **Programming languages**Module Description



Implementation Group
Doc.: EuCTSds/ EI-02
Date: 30 09 2025
Origin: RO MTA

Module details			
Main Topic	Recom- mended WH	Details	
Basics of the C programming language	8	Lecture (2h) and Applications (6h):  - Data types and the concept of variables and declarations in C programming.  - Types of operators: Arithmetic, Relational, Logical, Bitwise Operators.  - Performing mathematical operations with arrays, vectors, and matrices.  - Functions and libraries, including user-defined functions.  - The Linux operating system.  - Laboratory setup. Introduction to Makefile.	
Pointers	6	Lecture (2h) and Applications (4h):  - Concept, pointer arithmetic.  - Pointers and arrays.  - Function pointers.  - Common mistakes.	
Dynamic memory allocation	6	Lecture (2h) and Applications (4h):  - Dynamic memory allocation.  - Data structures (lists, stacks, graphs).  - Linear Data structures: Queue, Stack, Linked list.  - Non-Linear Data structures: Graph, Tree.	
Character arrays	6	Lecture (2h) and Applications (4h): - Character arrays in C Review of functions for character arrays Common mistakes with character array in C Stack overflow attacks.	
Code profiling	6	Lecture (2h) and Applications (4h):  - Big O notation and code profiling.  - Code profiling with Valgrind.  - Debugging pointers with Valgrind.  - Call Python code from C.  - DFT vs. FFT – code profiling.	
C vs. C++ memory management	4	Lecture (2h) and Applications (2h): - Short introduction to C++ and OOP The new and delete operators vs. malloc and free Pointers and references.	
Python memory management		Lecture (2h) and Applications (4h): - Introduction to Python Garbage collection.	
Total WH	42		
Additi	onal hour	s (WH) to increase the learning outcomes	
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise the work of students in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>	
Total WH	75		











## **Programming languages** Module Description



Implementation Group Doc.: EuCTSds/ EI-02 Date: 30 09 2025 Origin: RO MTA

## **BIBLIOGRAPHY:**

- Zed. A. Shaw. Learn C the hard way. <a href="http://c.learncodethehardway.org/book/">http://c.learncodethehardway.org/book/</a>
- Brian Kernighan, Dennis Ritchie. The C programming language. Prentice Hall, 1988,
- Al Sweigart. Automate the boring stuff with Python. Practical programming for total beginners. No starch press. Internet: <a href="https://automatetheboringstuff.com/#toc">https://automatetheboringstuff.com/#toc</a>
- Valgrind documentation. Internet: https://valgrind.org/docs/download docs.html
- Course presentations.

## **List of Abbreviations:**

CEFR Levels	B1, B2
Common European Framework of Reference for Languages	CEFR
European Credit Transfer and Accumulation System	ECTS
Graphical User Interface	GUI
Ordinary Differential Equations	ODE
Working Hour	WH







Countries

LoD-13



## **Computer Networks** Module Description

**European Technical Semester for Defence** 

and Security



Implementation Group Doc.: EuCTSds/ EI-03 Date: 30 09 2025 Origin: **RO MTA** 

Common Module **Computer Networks**  **ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	• English: Common European Framework of Reference for Languages (CEFR) Level B2
т	or min. NATO STANAG 6001 Level 3.
Language	• Teaching experience related to the topic
English	O International experience.
	• Relevant academic publications.

## **Prerequisites for international** participants

English: Common European of Reference Framework Languages (CEFR) Level B1 or NATO STANAG Level 2.

At least 1 year of national (military) higher education.

Basic knowledge of technical systems for security and defence

Security clearance: Unclassified information

## Goal of the Module

- Computer network topologies, network architectures, digital data transfer, packets, protocols and network processes, reference network models and hierarchical layers.
- Basic network device configuration.

outcomes	Know- ledge	<ul> <li>Explain the 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>
Learning out	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>
	Responsibi lity and autonomy	<ul> <li>Analyse 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: Students are evaluated during each session, in order to document their understanding of the basic concept of computer networks (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes selfevaluations after each lesson, and final test verifying learned knowledge (40%).



Revised by IG/LoD13





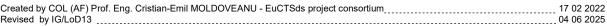


## Computer Networks Module Description



Implementation Group
Doc.: EuCTSds/ EI-03
Date: 30 09 2025
Origin: RO MTA

### Module details The content is as an example and depends on the course director decision Recommended **Main Topic Details** WH Lection: 2 h. Principles of open system network models - layers and protocols. Network applications and services – dns, http OSI Model for computer (https), email, ssh, rdp. 10 networks. Application layer Lab exercise (practice): 8 h. Network components. Basic services. Addressing. Building and testing a basic network topology. Encapsulation. Lection: 4 h. Transport-layer services in computer networks. Connectionless transport with UDP. Connection-oriented transport with TCP. Header fields. Network congestion 6 Transport layer control. Lab exercise (practice): 2 h. TCP segments and UDP datagrams inspection in a computer network. Usage of simulation software and/or Wireshark. Lection: 4 h. Logical addresses in computer networks. Internet Protocol version 4 (IPv4). Header fields. IPv4 Addressing. Internet Protocol version 6 (IPv6). Header fields. Static-routing configuration 10 Network layer Lab exercise (practice): 6 h. Classful and classless IPv4 address space calculation. IPv4 and IPv6 packets inspection with simulation software and/or Wireshark. Lection: 2 h. Data-link layer protocols. Ethernet frame structure. MPLS service. MAC addresses and switch CAM (MAC) tables. 4 Data-Link layer Lab exercise (practice): 2 h. LAN frames switching inspection with simulation software and/or hardware devices. Lection: 2 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 Computer networks physical internet access (HSPA, LTE). 10 layer Lab exercise (practice): 8 h. Cabling a computer network. Building a small network. Computer network and services inspection with simulation software or by means of hardware devices. Wi-Fi monitoring. Theoretical test -1 h. Final Exam 2 Practical exam (group project) – 1 h. **Total WH** 42











## **Computer Networks** Module Description



Implementation Group EuCTSds/ EI-03 30 09 2025 Doc.: Date: Origin: **RO MTA** 

Additional hours (WH) to increase the learning outcomes			
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>	
Total WH	75 3 ECTS		

## **BIBLIOGRAPHY:**

- 1. William Stallings, "Data and Computer Communications, 8/E", Prentice Hall, 2007
- 2. Andrew Tanenbaum, "Computer Networks, 5/E", Prentice Hall, 2013
- 3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach (7th Edition)", 2017

	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







LoD-13





Implementation Group Doc.: EuCTSds/ EI-04 Date: 30 09 2025 Origin: **RO MTA** 

European Security and Defence College		Microcontrollers  Module Description	Culoban Commo
Countries	European Tecl	hnical Semester for Defence	Cor

**European Technical Semester for Defence** 

and Security

Common Module Microcontrollers **ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or
Languaga	min. NATO STANAG 6001 Level 3.
Language	<ul> <li>Teaching experience related to the topic</li> </ul>
English	<ul> <li>International experience.</li> </ul>
	Relevant academic publications.

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

## Goal of the Module

- Basic concepts of architecture and operation of typical microprocessors and microcontrollers.
- Foundation for designing real world applications using microprocessors and microcontrollers.
- Programming and interfacing of microprocessors and microcontrollers.

les	Know- ledge	<ul> <li>Describe the basic principles of Microcontroller based design and development</li> <li>Explain the state-of-the-art interfacing technologies, their potential applications and their market views</li> </ul>		
earning outcomes	Skills	<ul> <li>Design and build functional prototypes for real-world applications.</li> <li>Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.</li> </ul>		
Leari	Responsibility and autonomy	<ul> <li>Compare accepted standards and guidelines to select the appropriate Microprocessor and Microcontroller to meet specified performance requirements.</li> <li>Analyse assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.</li> </ul>		

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of microcontrollers (20%).
- **Project**: Teamwork project and project defence (40%).
- **Test**: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







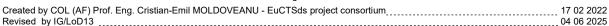


## **Microcontrollers**Module Description



Implementation Group
Doc.: EuCTSds/ EI-04
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director's decision Recommended Main Topic **Details** WH Definitions and types of processors. Differences between microprocessor and microcontroller. Construction and operation of the processor of 8-bit AVR microcontrollers. Introduction to Main functional blocks and microprocessor registers. microprocessors and 6 Electrical parameters, power supply systems, generating the microcontrollers. clock signal and resetting the microprocessor. Characteristics of the most popular microcontroller families. (Lecturer 2, Applications 4h) . Structure of a RAM and ROM memory cell. Memory map and organization of Flash, EEPROM and SRAM memory in Organization of AVR microcontrollers. Microcontroller programming program and data languages. Program (runtime) environments. Program memory, methods and structure and application software development cycle. 6 elements of Programming methods, access and protection of Flash microcontroller memory contents. EEPROM memory support. programming (Lecturer 2, Applications 4h) Construction of ports - basic input and output circuits of microcontrollers. Port lines in input / output mode with Basic input-output required properties. Dedicated registers for handling ports circuits and the 6 and input-output lines. Interrupt sources, interrupt vector. interrupt system of Interrupt service registers. Interrupt handling functions. microcontrollers. Examples of handling interrupts from a digital input. (Lecturer 2, Applications 4h) Operation of basic timer-counters. Clock signal sources for counters. Configure the subsystem of counters / timers in compare and capture mode. The use and program service of timer-counters to generate pulses with a given time and Timer-counter systems square waveforms with a given frequency, filling and shift. of microcontroller The use and program service of timer-counters to measure the pulse duration, period and filling of a square wave, shift between two waveforms. (Lecturer 2, Applications 4h) Construction of comparators, analog-to-digital (A / C) and Specialized inputdigital-to-analog (D / A) converters used in AVR systems output microcontrollers. Review of registers for A / C and D / A microcontrollers converters. Interrupts generated by these devices. 6 (analog comparators, A Programming of converters without and with the use of C and $\mathbf{C}$ interrupts. converters). (Lecturer 2, Applications 4h) . Characteristics of USART, I2C (TWI) and SPI transmission standards. Construction of USART, TWI and SPI controllers in microcontrollers of the AVR family. Registers and Built-in drivers for program service of individual interfaces. Usage and handling 6 serial transmission of interrupts generated by USART, TWI and SPI controllers. (Lecturer 2, Applications 4h)











## Microcontrollers Module Description



Implementation Group Doc.: Date : EuCTSds/ EI-04 30 09 2025 RO MTA Origin:

Organization of the microprocessor system, examples of readymade hardware platforms.	6	The concept of a microprocessor system. Microprocessor environment systems. Specialized circuits and input / output devices. Program support for SD memory, matrix keyboard, LED displays, character and graphic LCD displays and electric motors. Examples of ready-made microprocessor systems (e.g. Arduino) and SoC platforms (e.g. Raspberry Pi, Banana Pi).  (Lecturer 2, Applications 4h)
Total WH	42	
	Additional hours (WH	) to increase the learning outcomes
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>
Total WH	75 3 ECTS	

	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









## **Mechanics and Material Science** Module Description



Implementation Group Doc.: EuCTSds/ MA-01 Date: 30 09 2025 Origin: **RO MTA** 

Countries LoD-13

**European Common Technical Semester for Defence and Security** 

Common Module **Mechanics and Material** Science

**ECTS** 3.0

Service	Minimum Qualification of Instructors		
Technical/	Officers or civilian Lecturers:		
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or		
Languaga	min. NATO STANAG 6001 Level 3.		
Language	<ul> <li>Teaching experience related to the topic</li> </ul>		
English	<ul> <li>International experience.</li> </ul>		
- C	<ul> <li>Relevant academic publications.</li> </ul>		

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic principle of mechanics and material Science.
- Geometrical characteristics of materials, the stressstrain relationship, the schematisation of real, physical elements and the loads acting them.
- Modelling tools for mechanics and material science

earning outcomes	Know- ledge	<ul> <li>Describe the basic concepts related to the mechanics of various systems, statically determinate or indeterminate and the basic concepts related to the strength of materials: stresses, strains and their relation.</li> <li>Identify the basic equations needed for a system to be in equilibrium and the determination of its stress diagrams.</li> </ul>
	Skills	<ul> <li>Compute the geometrical characteristics of a given cross-section, the axial stress, shear stress and bending moment diagrams in a given system.</li> <li>Apply the modelling tools to determine the axial stress, shear stress and bending</li> </ul>
earı		moment diagrams in a given system and to interpret the results.
Ţ	Responsibility and autonomy	<ul> <li>Analyse and represent various systems of bodies having different supports and being subjected to different types of actions.</li> </ul>
		<ul> <li>Promoting logical, convergent and divergent reasoning, practical applicability and evaluation in decision-making.</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of mechanics and material science (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







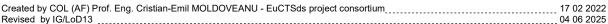


## Mechanics and Material Science Module Description



Implementation Group
Doc.: EuCTSds/ MA-01
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director's decision Recommended Main Topic **Details** WH Lecturer (2h) - the aim of the course, basic assumptions, and short - specific problems related to Mechanics and Strength of Introduction to Mechanics Materials. 6 and Strength of Materials - classification of bodies. Applications (4h): - internal forces and external forces. - stresses, specific deformations, characteristic curves. - mechanical properties of materials. Lecturer (2h) - static moments and moments of inertia and radii of gyration. - resistance modulus. Geometric characteristics 6 - Variation of the moments of inertia when changing the reference system. Main directions and moments of inertia **Applications (4h):** - computing the geometric characteristics for various crosssection shapes (I, T, L). Lecturer (4h) - physical model vs. mathematical model. - actions and reactions. Elements of Statics of 6 - supports convention. Systems Applications (2h): - statically determinate/ indeterminate systems. - diagrams. Lecturer (4h) - tensions, specific deformations, displacements. Axial stress 6 Applications (2h): - calculus relations. Lecturer (2h) - shearing small section elements and the duality of tangential stresses. simple bending, tensions, specific deformations, displacements. Shear stress and bending - calculus relations 6 **Applications (4h):** moment - computations and representations of the axial stress, shear stress and bending moment diagrams for various systems. - computations and representations of the axial stress, shear stress and bending moment diagrams for a truss. Applications (6h): Schematisation of elements schematisation of static determinate and indeterminate and actions. Calculation of 6 systems of actions and supports. - equilibrium equations and calculation of the reactions. reactions.











## **Mechanics and Material Science** Module Description



Implementation Group Doc.: Date : EuCTSds/ MA-01 30 09 2025 Origin: RO MTA

Modeling a static system and obtaining the stress diagrams	6	Applications (6h): - defining material properties choosing and defining section - choosing and modelling the system obtaining and interpreting the	right support conditions for a
Total WH	42		
Add	litional hours (WH	) to increase the learning outco	mes
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by str</li> <li>Preparation for the group pr</li> <li>Teamwork for the group pro</li> <li>Those hours comprise stude exercises to improve skills a</li> </ul>	oject.  vject.  nts' work in laboratories and
Total WH	75 3 ECTS	•	

	List of Abbreviations:
B1, B2	CEFR Levels
CEFR	Common European Framework of Reference for Languages
ECTS	European Credit Transfer and Accumulation System
GUI	Graphical User Interface
ODE	Ordinary Differential Equations
WH	Working Hour







LoD-13



## **Dynamic of Flight**



Implementation Group Doc.: EuCTSds/ MA-02 Date: 30 09 2025 **RO MTA** Origin:

Module Description and Defence College Countries

**European Common Technical Semester for** 

**Defence and Security** 

Common Module **Dynamic of Flight**  **ECTS** 3.0

Service	Minimum Qualification of Instructors
Technical/	Officers or civilian Lecturers:
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or
Languaga	min. NATO STANAG 6001 Level 3.
Language	<ul> <li>Teaching experience related to the topic</li> </ul>
English	<ul> <li>International experience.</li> </ul>
	Relevant academic publications.

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic principles of the fluid mechanics, aerodynamics and dynamic of flight: boundary layer, laminar and turbulent flows, aerodynamic forces and moments, external ballistics, 6-DOF trajectory
- Practical application of fluid mechanics, aerodynamics and dynamic of flight using CFD tools and MATLAB programming language.

les	Know- ledge	<ul> <li>Describe the basic concept of fluid mechanics, aerodynamics and dynamic of flight used the in security and defence field.</li> <li>Explain the basic fluid mechanics, aerodynamics and dynamic of flight equations and the main principles relevant to aerodynamic forces, moment and aerodynamic coefficients, 6-DOF trajectories.</li> </ul>
ning outcomes	Skills	<ul> <li>Calculate the aerodynamic forces and moments, aerodynamic coefficients and 6-DOF trajectories, based on CFD tools and Matlab programming language</li> <li>Design scenarios based on real applications and practical problems to underline how the topics treated in the course are used within engineering activity.</li> </ul>
Learning	Responsibility and autonomy	<ul> <li>Analyse the trends in development of the new technologies in the security and defence and their potential future application, based on fluid mechanics, aerodynamics and dynamic of flight concepts.</li> <li>Compare the numerical results of fluid mechanics, aerodynamics and dynamic of flight simulations with the real phenomenon from defence and security technology field.</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of fluid mechanics, aerodynamics and dynamic of flight (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







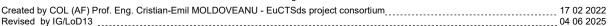


## **Dynamic of Flight**Module Description



Implementation Group
Doc.: EuCTSds/ MA-02
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director decision Recommended Main Topic **Details** WH Basic problem of fluid mechanics. Properties of fluids. Forces acting in fluids. Methods of fluid motion analysis, local motion of a fluid element. Basic equations of fluid mechanics (Lec:2h, Lab:4h) Basic Concepts and Laws of 6 Applications: Fluid Mechanics - Determination of the pressure resistance coefficient of a circular profile. Resistance of axisymmetric bodies - Determination of the pressure coefficient and total drag coefficient. Determination of differences Dynamics of viscous fluids. Navier - Stokes equation. Boundary layer. The similarity of flows. Friction and pressure resistance, well-flown bodies. Resultant forces acting on the streamlined body - coefficients of aerodynamic forces and moments (Lec:2h, Lab:4h) Dynamics of viscous fluids. **Applications:** Wave phenomena in the 1. Analytical solution of Navier - Stokes equations. dynamics of gases, 6 Calculation of flow parameters using the equation of motion influence of gas for selected specific flow cases. compressibility 2. First integrals of Euler's equation. Application of the Bernoulli equation in calculating the flow parameters using basic measuring instruments - Pitot tube and Ventouri. Bernoulli's equation in pressure form - static, dynamic and total pressure - Averaged Navier-Stokes equations (RANS). Turbulence modelling. - Average Navier-Stokes equations. Turbulent stress tensor, the so-called Reynolds. Application of turbulence models. An introduction to computational fluid dynamics (CFD). - Fluid Mechanics. Boundary layers. Stability, transition and turbulence. Heat transfer. Turbulence modelling 6 **Applications:** 1. Experimental measurement of the boundary layer thickness on a flat plate. Identification of laminar and turbulent boundary layer regions. 2. Determination of the local and average frictional coefficient over the flat plate. Calculation of the drag force. (Lec:2h, Lab:4h) - Exterior ballistics. Drag force, spin damping moment, lift and normal forces, overturning moment, Magnus force and moment. Center of pressure of the normal force and the magnus force. - External Ballistics. Forces acting on the projectile. Standard Basic concepts of exterior atmosphere. Stabilizing projectile during flight. Ballistic ballistics and dynamic of coefficients. Projectile drop. flight. Basic definitions, - Drag resistance. Transonic problem. Gyroscopic and forces and moments Coriolis drift, Magnus and Poisson effect. Empirical and Doppler measurement methods. (Lec:2h, Lab:4h) **Applications:** - Description of flying objects motion. Reference systems applied in exterior ballistics.











## **Dynamic of Flight**Module Description

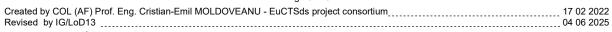


Implementation Group
Doc.: EuCTSds/ MA-02
Date: 30 09 2025
Origin: RO MTA

Point mass trajectory, modified point mass trajectory, 6-DOF trajectory	6	- Equations of motion. Constant Drag Coefficient, Drag coefficient inversely proportional to Mach number, and to the square root of Mach number. Change of independent variable from time to distance. Numerical solution of the equations of motions. Standard atmospheres for point-mass trajectories. Initial conditions for 6-DOF trajectories and MPM trajectories. Numerical solution for 6-DOF and MPM trajectories. Examples of 6-DOF and MPM trajectories. Examples of 6-DOF and MPM trajectories. Generalized Missile Equations of Motion. Coordinate Systems. Rigid-Body Equations of Motion. (Lec:2h, Lab:4h) Applications:  - Point mass trajectory, modified point mass trajectory, 6-DOF trajectory	
Aircraft perfomance	6	- Physical nature of drag and classical drag measurements. Airflow regimes. Effect of projectile shape on drag, drag of smooth spheres. Effect of yaw on drag and minimum drag projectile shapes. Equations of motion. Firing uphill and downhill. (Lec:2h, Lab:4h)  Applications:  - Measurement of aerodynamic forces and moments.	
Basic Concepts of Navigation and Dynamic of guided missiles/aircrafts	6	System Design and Missile Mathematical Model. The Missile Guidance System Model. Autopilots. Aerodynamics. Missile Guidance Laws. Guidance Intercept Techniques. Missile Equations of Motion. Fundamental Guidance Equations. Proportional Navigation. (Lec:2h, Lab:4h)	
Total WH	42		
Add	) to increase the learning outcomes		
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge</li> </ul>	
Total WH	75 3 ECTS		

List of Abbreviations:	
B1, B2	CEFR Levels
CEFR	Common European Framework of Reference for Languages
ECTS	European Credit Transfer and Accumulation System
GUI	Graphical User Interface
ODE	Ordinary Differential Equations
WH	Working Hour













## **Propulsion systems** Module Description



Implementation Group Doc.: EuCTSds/ MA-03 Date: 30 09 2025

Origin: **RO MTA** 

Countries
LoD-13

**European Common Technical Semester for Defence and Security** 

Common Module **Propulsion systems**  **ECTS** 3.0

Service	Minimum Qualification of Instructors				
Technical/	Officers or civilian Lecturers:				
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or				
т	min. NATO STANAG 6001 Level 3.				
Language	<ul> <li>Teaching experience related to the topic</li> </ul>				
English	o International experience.				
	Relevant academic publications.				

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

- Basic concepts of propulsion systems for military aircrafts, gun design and interior ballistics.
- Thermodynamic principles of air breading/fossilderived fuel powered systems.

Learning outcomes	Know- ledge	<ul> <li>Describe the mechanical and thermodynamics principles of propulsion systems for military aircrafts, as well as the basic concept of the gun design and interior ballistics.</li> <li>Identify different types of engines and basic principles of ballistic systems design and the main factors affecting engine selection and ballistic systems design.</li> </ul>
	Skills	<ul> <li>Design programs for modelling and simulation of propulsion systems for military aircrafts, as well as the interior ballistics of guns.</li> <li>Apply mechanical and thermodynamics principles of propulsion systems to solve basic defence and security technology applications.</li> </ul>
	Responsibility and autonomy	<ul> <li>Analyse the trends in development of the new technologies in the security and defence and their potential future application, based on principles of propulsion systems for military aircrafts, as well as the basic concept of the gun design and interior ballistics.</li> <li>Compare the numerical results of propulsion systems and interior ballistics simulations with the real phenomenon from defence and security technology field.</li> </ul>

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of propulsion systems (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).









## **Propulsion systems**Module Description



Implementation Group
Doc.: EuCTSds/ MA-03
Date: 30 09 2025
Origin: RO MTA

Module details  The content is as an example and depends on the course director's decision				
Main Topic	Recommended WH	Details		
Energy balance and equations of state	10	Lecture (4h) and Applications (6h) Thermodynamic systems. The first law of thermodynamics. Thermodynamic functions and potentials. Equation of state of ideal gas. Equations of state of real gases.		
Bernoulli equation - conditions for critical flow and flow through the nozzles	10	Lecture (4h) and Applications (6h) Nozzles. Mass and energy conservation equations. Conditions for critical flow.		
Basic construction of aircraft engines	10	Lecture (2h) and Applications (8h) Types engines and applications		
Propulsion in ballistic systems	6	Lecture (2h) and Applications (4h):  - Types of ballistic systems.  - Types of propellants.  - Ballistic characteristics.  - Experimental determination of impulse and covolume for a small calibre propellant		
Modelling/simulation of fundamental problem of interior ballistics for classical artillery systems	6	Lecture (2h) and Applications (4h):  - General consideration regarding fundamental problem of interior ballistics.  - Energy losses.  - Necessary equations for an interior balistic model.  - Solving the differential equations system in Mathcad/Matlab.		
Total WH	42			
Add	Additional hours (WH) to increase the learning outcomes			
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>		

## B1, B2 \_\_\_\_\_ CEFR Levels

CEFR Common European Framework of Reference for Languages

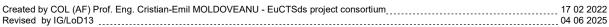
ECTS European Credit Transfer and Accumulation System

GUI Graphical User Interface

ODE Ordinary Differential Equations

WH \_\_\_\_\_ Working Hour

**List of Abbreviations:** 











## Computer Aided Desing and **Numerical Analysis** Module Description



Implementation Group Doc.: EuCTSds/ MA-04 Date: 30 09 2025 **RO MTA** Origin:

Countries LoD-13

**European Common Technical Semester for Defence and Security** 

Common Module **Computer Aided Desing** and Numerical Analysis

**ECTS** 3.0

Service	Minimum Qualification of Instructors				
Technical/	Officers or civilian Lecturers:				
ALL	o English: Common European Framework of Reference for Languages (CEFR) Level B2 or				
т	min. NATO STANAG 6001 Level 3.				
Language	<ul> <li>Teaching experience related to the topic</li> </ul>				
English	o International experience.				
	Relevant academic publications.				

## 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
- Basic knowledge of technical systems for security and defence
- Security clearance: Unclassified information

## Goal of the Module

- Basic concepts of Computer-Aided Design (CAD) and Computer-Aided Engineering (CEA) applied in defence and security technology systems.
- Application of advanced 3D modelling techniques used to define the geometry of objects described by free form surfaces. Implementation of devices like 3D scanners and CT in the designing process will be discussed.
- Fundamentals of preparation of Finite Elements Models, the definition of initial-boundary conditions, interpretation of obtained results of strength analysis will be discussed

Learning outcomes	Know- ledge	<ul> <li>Explain the designing process, Feature-based and Boolean algebra modelling techniques, free-form surface modelling techniques, fundamentals of technical drawings, application of reverse engineering,</li> <li>Identify the methods used in Finite Elements Analysis, strength analysis of mechanical objects, multibody analysis, kinematic and dynamic motion studies, parametric and topology optimisation.</li> </ul>				
	Skills	<ul> <li>Design mechanical objects and mechanisms using the 3D CAD system/ assemblie.</li> <li>Operate the 3D scanner, use the collected digital data from 3D measurements and conduct engineering strength analysis.</li> </ul>				
	Responsibility and autonomy	<ul> <li>Evaluate the correctness of mechanism operating based on the results of motion studies.</li> <li>Compare the numerical results of obtained based on Computer Aided Desing and numerical analysis with the real phenomenon from defence and security technology field.</li> </ul>				

- Observation: Students are evaluated during each session, in order to document their understanding of the basic concept of the CAD and numerical analysis (20%).
- **Project**: Teamwork project and project defence (40%).
- Test: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluations after each lesson, and final test verifying learned knowledge (40%).







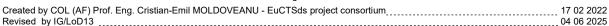


## Computer Aided Desing and Numerical Analysis Module Description



Implementation Group
Doc.: EuCTSds/ MA-04
Date: 30 09 2025
Origin: RO MTA

#### Module details The content is as an example and depends on the course director's decision Recommended Main Topic **Details** WH Characterisation of Computer Aided Design (CAD) systems, classification, main functionalities and range of their application. (Lec.: 2h; Applications.: 4h) Application of feature based and Boolean algebra functions, familiarisation with various commends used during 3D Characterisation modelling process, application of geometrical and Computer Aided Design dimensional relations, creating of mechanical parts 3D (CAD) systems, 6 classification, models with different geometrical features, definition of main functionalities and range assemblies 3D models, preparation of technical drawing based on 3D models. of their application **Applications:** - Modeling of 3D parts and assemblies definition in CAD SolidWorks system - Advanced tools available in a 3D parts modelling process Advanced methods of 3D design with the use of Reverse Engineering (Lec.: 2h; Applications.: 4h) Characterisation of various surface modelling techniques, Advanced methods of 3D free-form design, application of 3D scanners and CT, modeling process with the 6 functionalities of reverse engineering software, use of Reverse Engineering characterisation of the geometrical quality control process. **Applications:** - Practical application of 3D scanner and reverse engineering in a 3D modelling process Characterisation of CAD tools dedicated to specific design applications (Lec.: 2h; Applications.: 4h) Characterisation of **Applications:** available **CAD** tools - Design process of weldmetal and sheetmetal objects in 6 dedicated to specific design SolidWorks CAD system applications - How to design objects made from plastics? Design process of mold tools Characterisation of Computer Aided Engineering (CAE) Characterisation systems, classification, main functionalities and range of of their application (Lec:2h, Ex:4h) Computer Aided 6 Applications: **Engineering** (CAE) - Quick verification of engineering project correctness in systems SolidWorks system (4h) Introduction to Finite Element Analysis, characterisation of implicite and explicite numerical solving procedure, definition of initial-boundary condition, preparation of Finite Elements models, application of various FE elements, (Lec.: 2h; Applications.: 4h) Introduction to **Finite** 6 **Element Analysis (FEA)** • Applications: - Introduction to Ansys Workbench, various approaches of definition the FE models (4h) of Characterisation of mechanical strength analysis (under Application **Finite** 6 quasi-static, dynamic loading conditions), thermal analysis, Element Analysis in engineering practice introduction to optimisation (parametric and topology)











## Computer Aided Desing and **Numerical Analysis** Module Description



Implementation Group Doc.: EuCTSds/ MA-04 Date: 30 09 2025 Origin:

	studies. (Lec.: 2h; Applications.: 4h)			
		Applications:		
		- Mechanical strength analysis in Ansys Workbench		
		- Introduction to parametric and topology mechanical		
		optimisation		
Rigid body motion analysis with the use of CAE systems	6	Introduction to Multi Body Analysis (MBA), practical application of CAE software in motion studies, Degrees of Freedom definition in models, geometrical relations, kinematic and dynamic analysis, parametric optimisation. (Lec.: 2h; Applications.: 4h)  Applications: - Introduction to rigid Multi Body Analysis (2h) - Studies of mechanism correctness based on the results of motion analysis (4h)		
Total WH	42			
Additional hours (WH) to increase the learning outcomes				
Self-Studies and syndicate work	33	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge</li> </ul>		
Total WH	75 3 ECTS			

## **List of Abbreviations:** B1, B2 \_\_\_\_\_ CEFR Levels CEFR Common European Framework of Reference for Languages ECTS \_\_\_\_\_ European Credit Transfer and Accumulation System CAD Computer Aided Design CAE \_\_\_\_\_ Computer Aided Engineering CT \_\_\_\_\_ Computer Tomography RE Reverse Engineering WH \_\_\_\_\_ Working Hour









## Intercultural communication Module Description



Implementation Group
Doc.: EuCTSds/ ICom
Date: 30 09 2025
Origin: RO MTA

Countries **LoD-13** 

**European Common Technical Semester for Defence and Security** 

Common Module Intercultural communication

ECTS 2.0

Service	Minimum Qualification of Instructors				
Technical/	Officers or civilian Lecturers:				
ALL	<ul> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or</li> </ul>				
Language	min. NATO STANAG 6001 Level 3.  o Teaching experience related to the topic				
English	o International experience.				
	Relevant academic publications.				
SQF	Competence area - Communicator				
MILOF	• Learning area - Influence operations; strategic communications and media				
	Organisation level – common				

## 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 of technical systems for security and defence
- Security clearance: Unclassified information

### Goal of the Module

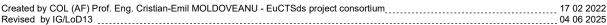
- Basic concepts of the communication theory, challenges and threats in a cross-cultural environment.
- Theories of culture and communication that help students/cadets to gain valuable skills for overcoming obstacles in crisis situations in a cross-cultural environment.
- Linguistic competencies in host country language and the ability to perceive the phenomena of the host country culture and civilization from the cultural diversity point of view.

Learning outcomes	<ul> <li>Describe the basic concepts related to intercultural and professional conused in the security and defence field.</li> <li>Identify the terminology that enables him/her to express opinions, prearguments and give feedback on intercultural and professional communitopics.</li> </ul>			
	Skills	<ul> <li>Apply the intercultural communication notions and concepts in various professior contexts.</li> <li>Gives examples of real applications and practical problems to underline how t topics treated in the course are used within the engineering activity;</li> </ul>		
	Respon- sibility and autonomy	<ul> <li>Argue the necessity of intercultural and professional communication support for efficiently navigating various professional contexts within the engineering activity.</li> <li>Analyse the trends in the development of intercultural and professional communication and their potential future impact.</li> </ul>		

## Verification of learning outcomes:

- **Observation**: Students are evaluated during each session, in order to document their understanding of the basic concept of intercultural communication and the linguistic competencies in the host country language (20%).
- **Project**: Teamwork project and project defence (40%).
- **Test**: Theoretical part of the Module can be conducted via the e-Learning which includes self-evaluation after each lesson, and final test verifying acquired knowledge (40%).

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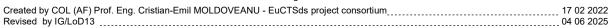


## **Intercultural communication**Module Description



Implementation Group
Doc.: EuCTSds/ ICom
Date: 30 09 2025
Origin: RO MTA

Module details the content is as an example and depends on the course director decision			
Main Topic	Recommended WH	Details	
Foundations of Intercultural and Professional Communication	6	Lecture (2h):  - The Global Perspective of Intercultural Communication - Specifics of the Host Country Language and Culture Applications (6h): Communication Across Cultures - Obstacles of Perception; Obstacles in Verbal Processes; Obstacles in Nonverbal Processes - Host Country Language: Grammar and Vocabulary	
Host Country Culture, Military Communication, Context and Power	6	Lecture (4h):  - Military Communication in Intercultural Contexts  - Cultural Awareness  - Host Country Language as a Tool  - Host Country Language Grammar and Vocabulary  Applications (6h):  - How Communication Reinforces Culture  - Communication as Resistance to the Dominant Cultural System  - Host Country Language: Grammar and Vocabulary	
Identity and Intercultural Communication	4	Lecture (2h): - Social and Cultural Identities. Personal Identity - Identity, Stereotypes and Prejudices in the host country and Abroad Applications (6h): - Identity Development Issues in the Military. Managing Intercultural Conflict - Gender Identity; Sexual Identity; Age Identity; Racial and Ethnic Identities; Religious Identity; Class Identity; National Identity; Regional Identity; Gender, Ethnicity, and Conflict in the Army - Host Country Language: Grammar and Vocabulary	
Language, Globalization and Nonverbal Codes	6	Lecture (2h):  - Cultural Variations in Communication Style  - The Power "Effects" of Labels  - The Universality of Nonverbal Behaviour  - Nonverbal Military Communication  Applications (6h):  - Identity Development Issues in the Military. Managing Intercultural Conflict  - Code Switching; Language Politics and Policies; Military Terminology Challenges  - Host Country Language: Grammar and Vocabulary	
Intercultural Relationships and Conflict	6	Lecturer(4h): - Strategies and Tactics for Dealing with Conflict - Productive Versus Destructive Conflict. Competition Versus Cooperation Applications (4h): - Final project defence.	
Total WH	28		











## Intercultural communication Module Description



Implementation Group Doc.: Date : EuCTSds/ ICom 30 09 2025 Origin: RO MTA

Additional hours (WH) to increase the learning outcomes			
Self-Studies and syndicate work	22	<ul> <li>Enhancing knowledge by studying specific documents.</li> <li>Preparation for the group project.</li> <li>Teamwork for the group project.</li> <li>Those hours comprise students' work in laboratories and exercises to improve skills and consolidate knowledge.</li> </ul>	
Total WH	50 2 ECTS		

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			







# EUROPEAN COMMON TECHNICAL SEMESTER FOR DEFENCE AND SECURITY (EuCTS\_DS)

## PROJECT NO 2020-1-RO01-KA203-080375



## **Interdisciplinary Scientific Project**











## EUROPEAN COMMON TECHNICAL SEMESTER FOR DEFENCE AND SECURITY

PROJECT NO 2020-1-RO01-KA203-080375

## **CONTENT**

1.	The aims of the Interdisciplinary Scientific Project	3
2.	Objectives of the Interdisciplinary Scientific Project	3
	Role of the project coordinator	
	Requirements of the student	
	Teamwork activity	
	Intermediary reports	
	Final report	
	The final presentation	

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## 1. The aims of the Interdisciplinary Scientific Project

The aim of the interdisciplinary scientific project is to train students in teamwork and emphasize realistic and real-life situations applied in defence and security technical systems, to demonstrate the ability to use modern design tools and techniques, to demonstrate the ability to plan and run a team-based project and to show the ability to communicate clearly in writing (through a proper project report) as well as by other means.

The work has to be completed within the time schedule and to be presented at an assessment meeting simulated as a board meeting. Great attention is paid to the ability to plan, delegate, communicate and co-operate as a team towards a common objective. The cohesive process needs to be organised so that the team members develop shared commitments and work collectively to achieve objectives that are agreed.

## 2. Objectives of the Interdisciplinary Scientific Project

After completing the Interdisciplinary Scientific Project, the student should be able to:

- contribute actively as an individual in the group work.
- work alone, independent of the group, in context and co-operation with the team.
- understand the professional responsibilities of the member team in context with different task.

## 3. Role of the project coordinator

Every student will have his/her project coordinator by an academic member of staff. The scientific coordinator tutor will:

- make themselves available for regular meetings for the duration of the project.
- Organise scientific trip in industrial facilities, laboratory or military units.
- advise on the compilation of the project proposal forms.
- advise on the project's aims, objectives and structure.
- give technical advice and support.
- arrange laboratory facilities, equipment, and space as required.
- procure any agreed material that is required.
- be involved with the interim and final assessments.
- advise on the format and contents of the written report.





## EUROPEAN COMMON TECHNICAL SEMESTER FOR DEFENCE AND SECURITY



PROJECT NO 2020-1-RO01-KA203-080375

## 4. Requirements of the student

- identify and distribute the project task among the team member, under the supervision of the scientific coordinator.
- attend and keep near perfect time keeping out of respect for the team members.
- arrange to have regular meetings the scientific coordinator and with the team member.
- start working on the project straight away and work steadily, do not leave it to the last minute.
- submit the interim assessment to the scientific coordinator by the due date.
- write the final written report.
- prepare for and attend the oral presentations.

## 5. Teamwork activity

The interdisciplinary scientific project requires to work in a team with other students from different countries/institutions/specialisations. Once the student is assigned to the project and to a team, considering the competences, knowledge and skills, a certain task will be distributes with the project. Among the main responsibilities: work as individual or as a team, take minutes, prepare and present intermediary reports, deal with unexpected problems, learn to communicate effectively within the team, prepare reports and prepare and deliver presentations.

## 6. Intermediary reports

The students will meet your scientific coordinators at least once a week, for about 1 hour, during which time you the student will be able to update on the progress of the work and receive support and guidance on the functioning of the team and of the project.

At least once at 2 weeks, the team has to present the intermediary results in front of the scientific coordinator and of the other teams. The student who will present the intermediary results has to be choose by rotation.

Reports and presentations must not be viewed as competitive but a shared outcome where the students and the project benefits from your involvement and participation. The format of the report will be discussed with the scientific coordinator.





## EUROPEAN COMMON TECHNICAL SEMESTER FOR DEFENCE AND SECURITY PROJECT NO 2020-1-RO01-KA203-080375



contribute.

The midterm report should be of around 15 pages, including figures, tables and all sources and citations. The presentation needs to provide all the information that the student knows about the project, how he is tackling the problem. How the team is functioning to solve the problem, a summary on what has been achieved to date and the plans for the following weeks. Each individual must

## 7. Final report

The Final report must be substantial in that it must reflect the activities of the project team in reaching their goals. It will have the same format of content as the midterm report but will require fuller descriptions of the project, the research carried out, the solution to the problem (describing all the facets, options and why the selected option was chosen), the business case, the marketing, the finance statement, how the team functioned, conclusions and all the necessary supporting documentation in the appendices. A report of 30-100 pages, excluding appendices, would not be unreasonable but this is only a guideline and depends on the project, its outcomes, and final conclusions.

First has to be described the objective of the project. Remember it may be reviewed by a variety of academics and industrialists who may not be familiar with the specifics of the project. Revised and updated targets, the project plan, Gantt Chart, team members, the management structure and organisation of the whole Project until the end. Remember to forecast clearly, what the team want to achieve (and what not), how the objective will be achieved it and how the team finally was organised. Present important achievements identified during the project.

## 8. The final presentation

In the last week of the activity the member team has to present the project, based on a Power point presentation. Timeframe: 30 minutes is allocated for each team presentation, followed by a question-and-answer session (around 20 min). The total time should not exceed 50 min for each team. Everybody in the team must present their chosen part/contribution on preferably what he/she is in charge of in the team.

With group projects each team depends on every member to contribute. Sometimes some students will contribute little or nothing to the group's effort. Therefore to ensure that all team members are fully motivated, a Peer Assessment system will be used, which enables all team members to grade the contribution of themselves and each team member. This means that each student can influence the marks of the other member of the team.



