Line of Development - 20

Space

Vyron ANTONIOU
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Eng, MSc, PhD, PostDoc in GeoInformatics

LoD 20 (Space)

Recognize the critical mass of Academic staff related to space.

Country	Name	Column1	Surname	Institution	EMAIL
Spain	Ignacio	de Goili	Alvarez	SPAFA	
Latvia	Janis		Gavrilovs		
Spain	Luis	Verjano	Zapata	SAFA	
Norway	Someb		Mushtaq	Naval Academy	
Portugal	Vasco		Coelho	PrAFA	
France	Philippe		Guillot	FASFA	
France	Ladislas		Szepessy	FASFA	
Romania	Vasile		Carutaru		
Spain		Martinez	Perez		
Bulgaria	Lumbomiv		Manov	BAFA	
Poland	Marek		Gauvyjdek	PAFU	
Belgium	Jean-Alain		Groovaerts	RMA	
Greece	Vyron		Antoniou	HAA	
Greece	Panagiotis		Papakanelos	HAFA	

LoD 20 SPACE

Please share with the LoD the contact details of all academics that might be related to Space domain.

AGENDA (67nd IG)

- Presentation of the CM
- Implementation Strategy and Academic Engagement
- Future Plans and Expansion Opportunities

LoD 20 (Space)

AGENDA (67nd IG)

Common Module
Space-based ISR & Situational Awareness
(SB ISR & SA)
Module Description

Implementation Group
Doc.: IG/XXXX
Status: DD MM YYYY
Origin: XXXXX

Country	Institution	Common Module	ECTS
GR	Hellenic Army Academy	Space-based ISR, Operations & Situational Awareness (SB ISR & SA)	2.0 (+ 1.0 e-learning)

Service: ALL	**Minimum Qualification for Lecturers** • Fully qualified Geospatial Engineer Officer. • Outstanding knowledge of Earth Observation and Remote Sensing Science Space Meteorology and/or Space Operations. • Phd Engineering, Mathematics and/or Physics applied to Space Operation. • Advanced experience in Geo-Intelligence • Specialists/Teaching experience in the field of Geospatial Engineering, Earth Observation or Geospatial Support. • English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG Level 3.
Language: English	
SQF MILOF	**Competence area** - Military technician **Learning area** – C4ISR systems & Space **Organisation level** - Single service

Prerequisites for international participants	Goal of the Module
• English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG Level 3. • Basic knowledge of IT (ECDL) or similar knowledge".	• Familiarize with the capabilities provided by the Copernicus Earth Observation SESA (Support to EU External and Security Actions) component • Exploit the SESA capabilities for ISR • Exploit the SESA capabilities for Situational Awareness • Acquire basic knowledge in space operations, orbital mechanics, space meteorology and space debris.

Learning outcomes		
	Knowledge	• Master remote sensing and data processing by learning remote sensing principles and data processing techniques for ISR and SA. • Understand space-based systems and operations by gaining knowledge of satellite types, orbits, payloads and space operations.
	Skills	• Apply satellite and ISR data for intelligence and operational decision-making by analyzing imagery, interpreting multi-source data, and using satellite information in operational scenarios. • Develop technical skills in geospatial analysis and orbital mechanics by applying image processing, using GEOINT tools and orbital elements.
	R & A	• Develop analytical and operational decision-making skills by critically analyzing ISR and SA data, recognizing threats, and understanding space-based intelligence and operational capabilities. • Collaborate effectively in intelligence analysis by working in teams to evaluate ISR intelligence, space operations and formulate responses.

Verification of learning outcomes:

- **Observation**: Throughout the module, students will discuss topics within syndicates and in the plenary. During this work, students are evaluated to verify their performance.
- **Evaluation:** Group presentations of given topics.
- **Test**: Written exam (multiple choice) at the end of the Module.

Origin: Assist. Prof. Vyron ANTONIOU, PhD/HMA ..... 26th of November 2025
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Common Module
Space-based ISR & Situational Awareness
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Implementation Group
Doc.: IG/XXXX
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Module details

Main Topic	Residential LU (WH)	E-learning LU (WH)	Details
Introduction to Space-Based ISR & SA	4 (3)	2 (1.5)	• Overview of ISR (Intelligence, Surveillance, and Reconnaissance) and SA (Situational Awareness) • History and evolution of space-based ISR & SA • Key advantages and challenges • Types of satellites used for ISR (e.g., optical, radar, signals intelligence) and SA • Satellite sensors and payloads • Space Operations Basic Parameters.
Fundamentals of Remote Sensing	3 (2.25)	2 (1.5)	• Basics of optical, radar, and hyperspectral imaging • Resolution (spatial, temporal, spectral) • Image acquisition and pre-processing
Image Processing for ISR	4 (3) (inc. 2 (1.5) SW)	3 (2.25)	• Image processing techniques • Practical session on image processing techniques
Image Analysis for ISR	3 (2.25) (inc. 2 (1.5) SW)	3 (2.25)	• Operational requirements for ISR and SA addressed by space-based assets • Practical session on image interpretation and analysis
Space-Based Communications, Navigation, Positioning	2 (1.5)	2 (1.5)	• Role of satellites in military communications • Secure data transmission and encryption • Satellite-ground station interaction • GNSS systems in ISR • Role in precision targeting and navigation • Jamming and spoofing threats
Threats to Space-Based Assets	2 (1.5)	2 (1.5)	• Space Surveillance and Tracking / Space Situational Awareness (SST/SSA) • Anti-satellite (ASAT) weapons and electronic warfare • Space debris • Cyber-threats to space assets
Applications of ISR and Situational Awareness in Military Operations	3 (2.25) (incl 2 (1.5) SW)		• ISR in border security, battlefield awareness, and maritime surveillance • Tactical and operational applications of ISR data • Integration of ISR data with command and control (C2) systems
Demonstration and Scenario-Based Training	5 (3.75) (incl 4 (3) SW)		• Group exercises using open-source satellite imagery
Exams	2 (1.5)	1 (0.75)	• Final Exam • Self-evaluation tests
Total lectures and e-learning lessons	**28 (21) (18 (13.5) + 10 (7.5) SW)**	**15 (11.25)**	A minimum of AKUs is part of the regular CM and is required in order to have a minimum of common knowledge before the residential phase. In addition, in the case of a 3 ECTS SB-ISR-SA CM Version, it is required that 1/3 of lectures are via e-learning. In both cases, the selection of e-learning topics is up to the Course Director mainly by using the e-learning materials available on the ESDC platform or provided by the institute.
Self- Studies	**22 (16.5)**	**10 (7.5)**	• Self-studies, pre-readings & self-evaluation tests. • E-learning may also be counted as self-studies.
Total	**50 (2 ECTS)**	**25 (1ECTS)**	The detailed amount of hours for the respective main topic is up to the course director according to national law or the home institution's rules

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List of Abbreviations:

AKU	Autonomous Knowledge Unit
ASAT	Anti-Satellite
B2	Common Reference Levels
C2	Command and Control
C4	Command, Control, Communication, and Computers
CEFR	Common European Framework of Reference for Languages
CM	Common Module
ECDL	European Computer Driving Licence
EU	European Union
ECTS	European Credit Transfer and Accumulation System
GEOINT	Geospatial Intelligence
GR	Greece
IG	Implementation Group
ISR	Intelligence, Surveillance and Reconnaissance
IT	Information Technology
NATO	North Atlantic Treaty Organisation
NF	Normalized Form
SA	Situational Awareness
SB	Space-Based
SESA	Support to EU External and Security Actions
SO	Space Operations
SSA	Space Situational Awareness
SST	Space Surveillance and Tracking
STANAG	Standardization Agreement
SW	Syndicate Work
WH	Working Hour

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AGENDA (67nd IG)

TOPIC	ACADEMIC TEACHING
Overview of ISR (Intelligence, Surveillance, and Reconnaissance) and SA (Situational Awareness)	
History and evolution of space-based ISR & SA	
Key advantages and challenges	
Types of satellites used for ISR (e.g., optical, radar, signals intelligence) and SA	
Satellite sensors and payloads	
Space Operations Basic Parameters.	
Basics of optical, radar, and hyperspectral imaging	
Resolution (spatial, temporal, spectral)	
Image acquisition and pre-processing	
Image processing techniques	
Practical session on image processing techniques	
Operational requirements for ISR and SA addressed by space-based assets	
Practical session on image interpretation and analysis	
Role of satellites in military communications	
Secure data transmission and encryption	
Satellite-ground station interaction	
GNSS systems in ISR	
Role in precision targeting and navigation	
Jamming and spoofing threats	
Space Surveillance and Tracking / Space Situational Awareness (SST/SSA)	
Anti-satellite (ASAT) weapons and electronic warfare	
Space debris	
Cyber-threats to space assets	
ISR in border security, battlefield awareness, and maritime surveillance	
Tactical and operational applications of ISR data	
Integration of ISR data with command and control (C2) systems	
Group exercises using open-source satellite imagery	

LoD 20 (Space) – Next Steps

- Share the Common Module to LoD-20 participants
- Share the Form for the Academic Teaching Offering for the CM topics
- Academic Offerings will be discussed in the next IG
- Plan to provide this CM during the Academic year 2025-2026 (Spring Semester as BIP)

RMA

HAA

HAFA

SAFA

FASFA

LNDA

LFA

PAFU

BAFA

PRAFA

RNONA

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