COURSE PROGRAM OVERVIEW

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) Course List

Course	Course Title	Duration	Modules and Dates (Residential/Online)	Instructor(s)
ACE101	Advanced Data Analytics, Modelling and Simulation.	4 weeks	ACE 101 A (res): Sep 15–25, 2025 ACE 101 B (res): Sep 29–Oct 9, 2025	Prof. Dr. Erdal ÇAYIRCI
ACE102	Wargaming and the Critical Analysis of Operation Plans.	2 weeks	ACE 102 A (res/online): Oct 13–16, 2025 ACE 102 B (res): Oct 19–23, 2025	Prof. Dr. Erdal ÇAYIRCI
ACE103	Technology Survey and Emerging Disruptive Technology Assessment.	2 weeks	ACE 103 A (res/online): Oct 27–30, 2025 ACE 103 B (res): Nov 2–6, 2025	Alexandru HUDISTEANU Assoc. Prof. Merve SEREN SME Speaker
ACE104	Geostrategic Analysis and Foresight Development.	2 weeks	ACE 104 A (res/online): Nov 10–13, 2025 ACE 104 B (res): Nov 16–20, 2025	Assoc. Prof. Merve SEREN Alexandru HUDISTEANU SME Speaker
ACE105	Computer Assisted Experimentation on Defense Plans.	2 weeks	ACE 105 A (res/online): Nov 24–27, 2025 ACE 105 B (res): Nov 30–Dec 4, 2025	Assoc. Prof. Merve SEREN Alexandru HUDISTEANU SME Speaker
ACE106	Computer Assisted Experimentation on Concepts and Doctrines.	2 weeks	ACE 106 A (res/online): Dec 8–11, 2025 ACE 106 B (res): Dec 14–18, 2025	Assoc. Prof. Merve SEREN Alexandru HUDISTEANU SME Speaker
ACE107	Computer Assisted Experimentation on Processes.	2 weeks	ACE 107 A (res/online): Jan 5–8, 2026 ACE 107 B (res): Jan 11–15, 2026	Alexandru HUDISTEANU Assoc. Prof. Merve SEREN SME Speaker
ACE108	Computer Assisted Experimentation on Capability Packages.	2 weeks	ACE 108 A (res/online): Jan 19–22, 2026 ACE 108 B (res): Jan 25–29, 2026	Assoc. Prof. Merve SEREN Alexandru HUDISTEANU SME Speaker

Pilot Course

Analysis and Computer Assisted Experimentation (ACE) Pilot Course

Course	Course Title	Duration	Modules and Dates (Residential/Online)	Instructor(s)
ACE103 M&S	Next Generation Technologies for Modelling and Simulation Capability	1 week	ACE 103 M&S (res): Nov 2–6, 2025	Alexandru HUDISTEANU Assoc. Prof. Merve SEREN SME Speaker

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 101

Course Title

Advanced Data Analytics, Modeling and Simulation.

Aim of the Course

This advanced-level course is designed for staff officers, strategic planners, military and defense analysts, and decision-makers affiliated with NATO Bodies, Member Nations, and Partner Countries. The primary aim is to equip participants with the theoretical foundations, methodological tools, and applied skills necessary to employ data analytics, probability and statistics, and simulation modeling in support of defense experimentation and transformation.

Through a structured module, the course develops a strong understanding of statistical and probabilistic methods relevant to military, defense, and security contexts. In line with this goal, participants are provided with tools to build and evaluate models and simulations for experimentation, capability assessment, and operational planning.

The course balances conceptual, theoretical, and methodological learning with structured hands-on sessions. Participants learn data analytics techniques and their applications in military experimentation. They also gain insight into modeling and combat modeling techniques. In addition, they receive training in the use of combat modeling and military simulation systems (Live, Virtual, and Constructive).

The course further enhances participants' understanding of randomization, stochastic processes, and simulation. At the same time, it strengthens their ability to analyze uncertainty, interpret experimental data, and generate decision-support insights. Fundamentally, the course aims to prepare participants to develop expertise in military simulation systems and their application areas.

Expected Learning Outcomes

This course is specifically intended for military and civilian professionals involved in military transformation, the defense industry, strategic planning, politico-military decision-making, and operational planning. The course emphasizes the application of data analytics, modeling, and simulation as essential tools for understanding complex security environments, enhancing operational effectiveness, and supporting evidence-based decision-making.

It offers a comprehensive integration of conceptual, theoretical, methodological, and institutional frameworks with practical applications in modeling and simulation, enabling participants to translate knowledge into real-world contexts. The training approach ensures that participants not only understand the concepts, methodologies, and tools required for advanced data analytics but also acquire deeper insights into the development,

implementation, and integration of data analytics capabilities through modeling and simulation solutions.

Upon successful completion of the course, participants will be able to define, classify, and apply different types of models, including physical, iconic, analogue, symbolic, and mathematical models. They will also develop the ability to distinguish between types of simulations, such as deterministic, stochastic, discrete, continuous, dynamic, and interactive approaches.

Participants will be trained to perform descriptive statistical analyses, including measures of central tendency and dispersion, as well as the construction and interpretation of histograms and frequency distributions. They will further apply probability theory, covering the rules of probability, Bayes' theorem, conditional probability, and counting techniques. Building on this foundation, they will utilize discrete probability distributions such as binomial, geometric, negative binomial, hypergeometric, and Poisson, as well as continuous distributions including uniform, exponential, normal, gamma, and Weibull, for operational analysis.

The course will also provide a solid understanding of Monte Carlo simulation techniques, enabling participants to model uncertainty and operational risk. In this context, they will learn to differentiate between epistemic and aleatory uncertainty and evaluate their implications for military decision-making. Moreover, participants will be equipped to design and interpret confidence intervals and conduct hypothesis testing tailored to defense applications.

Finally, participants will gain familiarity with a range of combat modeling and military simulation systems, including MILES, TES, LTESS, WES, VBS4, JCATS, JTLS, in particular **Hymots®**, and **Etecube®**. By the end of the course, they will be able to integrate modeling, simulation, and analytics into the critical analysis of operational plans, thereby strengthening their ability to support defense experimentation, capability assessment, and operational planning.

Instructional Model

The course is structured around two integrated training modules, offering participants a comprehensive combination of a theoretical–methodological framework and a practical application module. These modules are designed to complement one another, enabling participants to first build a strong conceptual foundation and then apply their knowledge through structured, hands-on exercises. The overarching aim is to connect theoretical knowledge with analytical and practical skills, ensuring that participants develop expertise in advanced data analytics, modeling, and simulation.

The module agenda begins with fundamental topics such as definitions and descriptive statistics, before advancing into probability theory, randomization, and hypothesis testing. Participants will also study goodness of fit, correlation, regression, and analysis of variance as part of their statistical training. Building on this foundation, the course introduces stochastic processes and progresses into applied areas, including combat modeling and the use of military simulation systems. Through this integrated approach, participants will be

able to translate theoretical and methodological knowledge into practical applications relevant to defense experimentation and operational planning.

Conceptual, Theoretical, Methodological & Institutional Framework

This part introduces participants to the conceptual and methodological building blocks of advanced data analytics, modeling, and simulation. Topics include:

Concepts & Definitions

- Introduction to modeling and simulation in defense.
- Classification of models (physical vs mathematical).
- Classification of simulations: deterministic vs stochastic, static vs dynamic, discrete vs continuous, interactive vs non-interactive.

Statistical and Probability Foundations

- Populations and samples, frequency distributions, tables, histograms.
- Measures of central tendency (mean, median, mode).
- Measures of dispersion (variance, standard deviation, range, interquartile range).
- Probability theory: probability rules, addition/multiplication principles, conditional probability, Bayes' theorem.
- Counting techniques: permutations, combinations.

Probability Distributions

- Discrete: Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson.
- Continuous: Uniform, Exponential, Normal, Gamma, Weibull.
- Military applications of distributions for reliability, survival analysis, and operational risk modeling.

Uncertainty Modeling

- Epistemic vs aleatory uncertainty.
- Application of uncertainty models in defense experimentation.

Mathematical & Simulation Techniques

- Monte Carlo simulation: theory, examples, and operational use cases.
- Stochastic processes in defense analytics.
- Central Limit Theorem and implications for combat modeling.
- Confidence intervals and hypothesis testing in military experimentation.

Military Applications

- Combat modeling: purpose, scope, and method.
- Live, Virtual, Constructive simulations (TES, LTESS, SAWE, WES).
- Constructive simulation systems: JTLS, JCATS, VBS4.
- Hybrid Multidomain Operations Tactics and Strategy Simulator (HYMOTS)
- NATO and national applications in force development and training.

Practical Application (Hands-On)

The second part of the course focuses on the practical application of theoretical knowledge in realistic and operationally grounded settings. Participants engage in structured and guided assignments designed to build expertise in applying modeling and simulation (M&S) tools and processes. This component emphasizes applied experimentation, simulation exercises, and software-based training, ensuring that participants can directly translate theoretical knowledge into defense-relevant practice.

In this context, participants conduct assignments on descriptive statistics, probability theory, and probability distributions, followed by Monte Carlo simulations applied to combat scenarios. They also carry out data analysis tasks using real or simulated operational data and engage in hands-on exercises with **Hymots®** and **Etecube®** for defense experimentation. Case studies further reinforce the link between statistical distributions and operational planning, while dedicated projects require participants to design and execute simulation-supported analyses.

Special emphasis is placed on framing research and operational questions, identifying key variables, structuring experimentation, and presenting clear findings. The practical module culminates in a final assessment project, where participants conduct a defense-related analytics and simulation study, applying the statistical and modeling tools introduced earlier in the course.

Participants are also introduced to proven simulation solutions, including **Hymots®** and **Etecube®**. Using these platforms, they work individually and in teams to plan, design, develop, conduct, and interpret wargames. These exercises go beyond technical training: they are embedded in doctrinal scenarios and operational problems, ensuring that learning remains context-driven, operationally relevant, and aligned with defense experimentation objectives.

The practical sessions are designed to reflect different phases of advanced data analytics, modeling, and simulation, selected for both their methodological rigor and practical applicability. Following these in-class exercises, participants are assigned team projects to demonstrate their ability to apply the tools and techniques presented. The module concludes with a final assessment project, requiring participants to design and execute a simulation-supported analysis that addresses a defined operational requirement.

Assessment

Assignments: 20%

Quizzes: 30%

Final Exam/Project: 50%

Participants must obtain a minimum of 50 percent in each component and achieve an overall average of 70 percent in order to pass.

Module Agenda

Duration: 4 Weeks

Module I (ACE 101-A) Full Residential (R Model)

Format: In-class training
Duration: 10 days (Sunday–Thursday)

Dates: 15–25 September 2025
Location: Doha, MDIWTC

Module II (ACE 101-B) Full Residential (R Model)

Format: In-class training
Duration: 10 days (Sunday–Thursday)
Dates: 29 September–09 October 2025
Location: Doha, MDIWTC

Notes

- Sunday marks the start of the official working week.
- ACE-101 Course is delivered exclusively by Prof. Dr. Erdal Çayırcı. The assistant instructors, serving as course facilitators, are Mr. Alexandru Hudisteanu and Mrs. Merve Seren.
- The ACE-101 course does not include SME guest speakers.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing ACE 101 will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructor(s)

- Prof. Dr. Erdal Çayırcı
- Mr. Alexandru Hudisteanu (Assistant Instructor)
- Mrs. Merve Seren (Assistant Instructor)

Course's Full Residential Module

Week 1: 15–18 September 2025
Instructor: Prof. Dr. Erdal Çayırcı

Monday, 15 September 2025

Time	Topic
08:00–08:50	*Opening Speech* Understanding the Current and Future Impacts of Military Transformation
Break (10 minutes)	
09:00–09:50	Conceptual, Structural & Institutional Framework of Course Modules (ACE 101–108)
Break (10 minutes)	
10:00–10:50	Definitions of Modelling & Simulation; Types of Models
Break (10 minutes)	
11:00–11:50	Types of Simulations (i.e., Deterministic, Stochastic, Static, Dynamic)
Break (10 minutes)	
12:00–12:50	Monte Carlo Simulation: Concepts and Applications

Tuesday, 16 September 2025

Time	Topic
08:00–08:50	Theoretical Foundations: ○ Church–Turing Thesis ○ Gödel's Incompleteness Theorems ○ Computational Complexity
Break (10 minutes)	
09:00–09:50	Modelling Uncertainty: Aleatory (Stochastic) vs Epistemic
Break (10 minutes)	
10:00–10:50	Simulation Categories: Live, Virtual, Constructive
Break (10 minutes)	
11:00–11:50	Applications of Simulation in Defense & Intelligence
Break (10 minutes)	
12:00–12:50	Case Examples & Discussion

Wednesday, 17 September 2025

Time	Topic
08:00–08:50	Live Simulators: Concepts and Categories
Break (10 minutes)	
09:00–09:50	Direct and Indirect Fire Training Systems (LTESS, TES, SAWE, WES)
Break (10 minutes)	

10:00–10:50	Virtual Simulators: Motion & Acceleration
Break (10 minutes)	
11:00–11:50	Medical Simulation Systems and Virtual Reality (VR) Support
Break (10 minutes)	
12:00–12:50	In-Class Discussion: Strengths and Weaknesses

Thursday, 18 September 2025

Time	Topic
08:00–08:50	Constructive Simulations: Categories, Levels & Objectives
Break (10 minutes)	
09:00–09:50	Constructive Simulations: ○ Service Models ○ Joint Models ○ Expert Models
Break (10 minutes)	
10:00–10:50	Military Constructive Simulation Systems in Practice: JTLS , JCATS, VBS4
Break (10 minutes)	
11:00–11:50	Introduction to **Hymots®** and **Etecube®** Platforms: Hybrid Multidomain Operations Tactics and Strategy Simulator
Break (10 minutes)	
12:00–12:50	Week 1 Wrap-Up and Q&A

Week 2: 21–25 September 2025
Instructor: Prof. Dr. Erdal Çayırcı

Sunday, 21 September 2025

Time	Topic
08:00–08:50	Introduction to Applied Statistical Thinking for Modeling and Simulation (M&S)
Break (10 minutes)	
09:00–09:50	Statistics: Populations vs Samples
Break (10 minutes)	
10:00–10:50	Descriptive Statistics: ○ Data Array ○ Stem and Leaf ○ Frequency Distribution ○ Histogram and Percentiles
Break (10 minutes)	
11:00–11:50	Measures of Central Tendency: Mean, Median, Mode
Break (10 minutes)	
12:00–12:50	Measures of Dispersion: Variance & Standard Deviation

Monday, 22 September 2025

Time	Topic
08:00–08:50	Basics of Probability Theory
Break (10 minutes)	
09:00–09:50	Probabilistic Approaches
Break (10 minutes)	
10:00–10:50	Probability Rules: Addition & Multiplication
Break (10 minutes)	
11:00–11:50	Conditional Probability, De Morgan's Law and Bayes' Theorem
Break (10 minutes)	
12:00–12:50	Conditional Probability, De Morgan's Law and Bayes' Theorem (continue)

Tuesday, 23 September 2025

Time	Topic
08:00–08:50	Counting Principles in Probability
Break (10 minutes)	
09:00–09:50	Permutations and Combinations
Break (10 minutes)	
10:00–10:50	Discrete Probability Distributions Overview
Break (10 minutes)	
11:00–11:50	Binomial Distribution
Break (10 minutes)	
12:00–12:50	Case Study: Binomial Applications in Military Ops

Wednesday, 24 September 2025

Time	Topic
08:00–08:50	Geometric Distribution
Break (10 minutes)	
09:00–09:50	Negative Binomial Distribution
Break (10 minutes)	
10:00–10:50	Hypergeometric Distribution
Break (10 minutes)	
11:00–11:50	Poisson Distribution
Break (10 minutes)	
12:00–12:50	In-Class Exercise (Group Discussion)

	Comparing Distributions

Thursday, 25 September 2025

Time	Topic
08:00–08:50	Continuous Distributions Overview
Break (10 minutes)	
09:00–09:50	Uniform Distribution
Break (10 minutes)	
10:00–10:50	Exponential Distribution
Break (10 minutes)	
11:00–11:50	Normal Distribution: Concepts
Break (10 minutes)	
12:00–12:50	Military Applications of the Normal Distribution

Week 3: 28 September – 02 October 2025
Instructor: Prof. Dr. Erdal Çayırcı

Sunday, 28 September 2025

Time	Topic
08:00–08:50	Advanced Normal Distribution: Standardization (z-scores) Gamma Distribution & Weibull Distribution
Break (10 minutes)	
09:00–09:50	Applications of Normal Distribution in Combat Modelling
Break (10 minutes)	
10:00–10:50	Confidence Intervals & Central Limit Theorem
Break (10 minutes)	
11:00–11:50	Hyphothesis Test
Break (10 minutes)	
12:00–12:50	Goodness of fit In-class samples

Monday, 29 September 2025

Time	Topic
08:00–08:50	Correlation and Assumptions
Break (10 minutes)	
09:00–09:50	Regression & Multiple Regression
Break (10 minutes)	
10:00–10:50	Analysis of Variance (ANOVA)

Break (10 minutes)	
11:00–11:50	Stochastic Processes Examples Stochastic Processes
Break (10 minutes)	
12:00–12:50	In-Class Exercise (Group Work)

Tuesday, 30 September 2025

Time	Topic
08:00–08:50	Basics of Data Analytics
Break (10 minutes)	
09:00–09:50	Pseudorandom Number Generation & Generators
Break (10 minutes)	
10:00–10:50	Linear Congruential Generators (LCG) ○ Mixed LCG ○ Multiplicative LCG In-class samples
Break (10 minutes)	
11:00–11:50	Realization of Random Variables
Break (10 minutes)	
12:00–12:50	In-class Exercises

Wednesday, 01 October 2025

Time	Topic
08:00–08:50	Introduction to Phases of Simulation
Break (10 minutes)	
09:00–09:50	Input and Output Data Analysis: ○ Goodness of fit test ○ Verification of data ○ Validation of data ○ Confidence Intervals ○ Correlation tests ○ Hypothesis tests
Break (10 minutes)	
10:00–10:50	Combat Modelling
Break (10 minutes)	
11:00–11:50	Lanchester Equations: Types, Functions and Models (Part I)
Break (10 minutes)	
12:00–12:50	Lanchester Equations: Types, Functions and Models (Part II)

Thursday, 02 October 2025

Time	Topic
08:00–08:50	Synthetic Natural Environments ○ real ○ semi-fictitious ○ fictitious
Break (10 minutes)	
09:00–09:50	Projection Systems Universal Transverse Mercator Military Grid Reference Geographical Coordinate System: World Geodetic System (WGS84)
Break (10 minutes)	
10:00–10:50	Raster Data (Digital Raster Graphs) GIS Imagery Proprietary Raster Formats for Terrain Data Digital Elevation Models (DEM) Interpolation on a Grid Weather Data in Hymots® Vector Data (Digital Line Graphs) 3-Dimensional (3D) File Formats
Break (10 minutes)	
11:00–11:50	Sensors, Engagement & Movement
Break (10 minutes)	
12:00–12:50	Week 3 Wrap-Up and Feedback

Week 4: 05–09 October 2025
Instructor: Prof. Dr. Erdal Çayırcı

Sunday, 05 October 2025

Time	Topic
08:00–08:50	Introduction to Mathematical Programming ○ Sensitivity Analysis ○ Defining Objectives ○ Defining Constraints
Break (10 minutes)	
09:00–09:50	Simplex Method (Part I): 8 Steps of Simplex Method
Break (10 minutes)	
10:00–10:50	Simplex Method (Part II) 8 Steps of Simplex Method
Break (10 minutes)	

11:00–11:50	Simplex Method for Minimization Simplex Method for Maximization
Break (10 minutes)	
12:00–12:50	Mathematical Programming in Excel Reflection and Q&A

Monday, 06 October 2025

Time	Topic
08:00–08:50	Game Theory
Break (10 minutes)	
09:00–09:50	Types of Games (Part I) ○ Strategic (Normal) Form Games with Complete/Incomplete Information ○ Extensive Form Games with Complete/Incomplete Information
Break (10 minutes)	
10:00–10:50	Types of Games (Part II) ○ Strategic (Normal) Form Games with Complete/Incomplete Information ○ Extensive Form Games with Complete/Incomplete Information
Break (10 minutes)	
11:00–11:50	Types of Games (Part III) ○ Strategic (Normal) Form Games with Complete/Incomplete Information ○ Extensive Form Games with Complete/Incomplete Information
Break (10 minutes)	
12:00–12:50	Evaluation and Feedback

Tuesday, 07 October 2025

Time	Topic
08:00–08:50	Verification, Validation and Accreditation: Simulation Conceptual Model
Break (10 minutes)	
09:00–09:50	Categories of Validation ○ Prospective ○ Retrospective ○ Full Scale ○ Partial ○ Cross ○ Revalidation ○ Concurrent
Break (10 minutes)	
10:00–10:50	Model Validation Methods (Part I)
Break (10 minutes)	
11:00–11:50	Model Validation Methods (Part II)
Break (10 minutes)	
12:00–12:50	Peer Review and Reflection

Wednesday, 08 October 2025

Time	Topic
08:00–08:50	Interoperability
Break (10 minutes)	
09:00–09:50	Distributed Interactive Simulation (DIS)
Break (10 minutes)	
10:00–10:50	High Level Architecture (HLA)
Break (10 minutes)	
11:00–11:50	Federation Object Model (FOM)
Break (10 minutes)	
12:00–12:50	NATO Education and Training Network FOM

Thursday, 09 October 2025

Time	Topic
08:00–08:50	Student Project Presentations (Part I)
Break (10 minutes)	
09:00–09:50	Student Project Presentations (Part II)
Break (10 minutes)	
10:00–10:50	Evaluation of Assignments and Peer Review
Break (10 minutes)	
11:00–11:50	Final Comments and Feedback
Break (10 minutes)	
12:00–12:50	Certification Ceremony & Group Photo (MDIWTC Leadership)

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 102

Course Title

Wargaming and the Critical Analysis of Operation Plans.

Aim of the Course

This advanced-level course is designed for staff officers, strategic planners, military and defense analysts, and decision-makers affiliated with NATO Bodies, Member Nations, and Partner Countries. Its primary aim is to equip participants with the theoretical foundations, methodological tools, and practical skills necessary to develop, design, integrate, and implement wargaming through computer-assisted experimentation.

By exploring structured wargaming models, processes, organizational frameworks, and the roles and responsibilities of the players, the course prepares attendees to address real-world scenarios aligned with military, defense, intelligence, and technological objectives.

The course balances conceptual learning with structured hands-on sessions to ensure that participants gain both intellectual insight and operational proficiency in wargaming. In this regard, participants will be empowered to plan, conduct and evaluate wargames at the strategic, operational, and tactical levels. Furthermore, they will develop an understanding of the broader strategic and institutional dynamics that shape the design and delivery of complex wargaming solutions.

Expected Learning Outcomes

This course is designed for military and civilian professionals engaged in education, training. strategic planning, and the process of political-military decision-making. It provides a comprehensive blend of conceptual knowledge and practical experience in modeling and simulation, with a particular focus on developing and conducting wargame processes.

The training approach ensures that participants will understand the critical importance of selecting the appropriate wargame variant and the significance of applying accurate methodologies. Attendees will also gain in-depth insights into the dynamics of developing, implementing, and integrating wargames as strategic tools for education, training, planning, and decision-making.
By the end of the course, participants will be able to:

- Understand the wargame development process in alignment with institutional goals, whether at the national level or in support of alliance-wide objectives.
- Recognize the significance of timely execution of wargames from short, medium, and long-term perspectives.
- Comprehend the development, design, and organization of wargaming modules.

- Distinguish between wargaming variants and their methodologies.
- Identify the roles, tasks, and responsibilities of actors in a wargame.
- Manage wargaming processes from specification to reporting stages.
- Plan and execute a computer-assisted wargame to support education, training, and political-military decision-making objectives.
- Apply the wargaming process, including Design, Development, Execution, Validation, and Refinement.
- Execute wargaming models based on proven solutions in various operational contexts by employing **Hymots®C** and **Etecube®.**
- Apply approaches for the critical analysis of plans, including identifying types of plans and applying best practices in their analysis.
- Gain practical wargaming experience through in-class training and exercises.
- Extract lessons identified and best practices from conducted wargames.

Instructional Model

The course is structured around two integrated training modules, offering participants a comprehensive blend of a theoretical–institutional framework and a practical application module. These modules are designed to complement each other, allowing participants to first build a strong conceptual foundation and then apply what they have learned through structured, hands-on exercises. The aim is to link strategic-level thinking with operational tools, ensuring that participants can confidently move between abstract design and practical execution in the field of wargaming.

Theoretical & Institutional Framework

The first part of the course introduces the conceptual, historical, and structural foundations of wargaming. It begins with fundamental questions such as “What is a wargame?”, “How have wargames developed throughout history from the era of Kriegsspiel?”, and “What are the objectives and principles of wargames?”. Participants also examine how wargames are organized, who the actors are, and how wargames are conducted at the tactical, operational, and strategic levels.

Subsequently, the focus shifts to the institutional, national, and international applications of wargaming, highlighting how organizational structures play a crucial role in shaping and supporting development processes. Participants explore the wargame cycle, with special attention to the stages and phases of wargame development. These sequential phases are essential for understanding the core methodology of wargaming, including the duties, responsibilities, and interactions of actors, as well as the organizational roles involved, particularly in joint and/or multinational wargames. In other words, this module emphasizes the planning, design, management, and conduct of wargames, by covering key elements such as identifying training objectives, assigning roles, and interpreting outcomes.

The curriculum also introduces participants to the logic of the Critical Analysis of Operational Plans. Training includes not only the tools used during the design and

execution phases of operational planning, but also the methods to establish causality, measure outcomes, and ensure that wargames generate meaningful operational feedback.

Practical Application

The second part of the course focuses on applying theoretical knowledge in realistic, operationally grounded settings. Participants engage in structured and guided assignments for computer-assisted wargames aimed at building expertise in applying modeling and simulation (M&S) tools and processes.

In this regard, participants are introduced to the proven solutions provided by Hymots®C and Etecube®. Through these two softwares, participants work individually and in teams to plan, design, develop, conduct, and interpret wargames. These exercises are not merely technical trainings; they are integrated into doctrinal scenarios and operational problems to ensure that learning remains context-driven and relevant.

In-class training sessions are designed to reflect different phases of wargames, selected for their methodological value and practical relevance. Following the in-class training, participants are assigned projects to ensure that they can translate theoretical knowledge into the use of the tools and techniques presented during the sessions.

Special emphasis is placed on assisting participants frame objectives, identify key variables, and present clear conclusions. The practical module culminates in a final assignment where participants must demonstrate their ability to structure and execute a wargame flow that responds to a defined operational requirement.

Module Agenda

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 13-16 October 2025
Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)
Dates: 19-23 October 2025
Location: Doha, MDIWTC.

Notes

- Sunday marks the start of the official working week.
- Participants will be assigned both in-class training exercises and projects on wargame development process and critical analysis of operation plans.
- ACE-102 is instructed exclusively by Prof. Dr. Erdal Çayırcı. The assistant instructors, serving as course facilitators, are Mr. Alexandru Hudisteanu and Mrs. Merve Seren.

- The ACE-102 course does not include SME guest speakers.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructor(s)

- Prof. Dr. Erdal Çayırcı
- Mr. Alexandru Hudisteanu (Assistant Instructor)
- Mrs. Merve Seren (Assistant Instructor)

Course's Full Residential Module

Monday, 13 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Introducing the Conceptual Framework	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Theoretical and Institutional Perspective: Wargaming & Critical Analysis of Operational Plans	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Wargaming Methodologies: Categories & Characteristics 1. Computer-Assisted Command Post Exercises (CAX) 2. Computer-Assisted Wargames 3. Computer-Assisted Military Experiments	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Exploring the Critical Analysis of Plans: Stages & Phases Main Process Flow: 1. Discovery Experiment 2. Hypothesis and Validation Experiments 3. Demonstration Experiment	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Historical Foundations of Wargaming: From Kriegsspiel to Modern Wargames	Prof. Dr. Erdal Çayırcı

Tuesday, 14 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Portraying the Wargaming Concept as: • A Simulation • A Technique • A Process	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Reasons to Play Wargames: • Education • Training • Political-military Decision-Making • Political-military Decision-Planning	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Analyzing the Promises and Perils of Wargaming: • Strengths • Weaknesses	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Expectations & Applications of Wargames 1. Education and Training 2. Executive Decision-Making 3. Planning	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Principles of Wargaming	Prof. Dr. Erdal Çayırcı

Wednesday, 15 October 2025

Time	Topic	Instructor(s)

08:00–08:50	Organizing a Wargame: Key Actors & Roles (Part I) 1. Game Sponsor 2. Game Director 3. Wargame Team • Sponsor Representative • Designers • Analysts • Simulation Experts	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Organizing a Wargame: Key Actors & Roles (Part II) 4. Game Controller • Adjudication • Facilitation	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Organizing a Wargame: Key Actors & Roles (Part III) 5. Players	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Essentials of Wargame Organization	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Couse of Actions (CoAs) in the Wargaming • CoA 1 • CoA 2 • CoA 3	Prof. Dr. Erdal Çayırcı

Thursday, 16 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Adjudication in a Wargame • Free Adjudication • Rigid Adjudication • Semi-Rigid Adjudication • Minimal/Consensual	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Supporting Adjudication • Operational Analysis • Computers • Moderation • Role Play	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Types of Wargames (Part I) • Seminar Game • Course of Action (CoA) Wargames • Matrix Games	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Types of Wargames (Part II) • Kriegsspiel • Historical and Hobby Wargames • Business Wargame	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Commercial Board Games	Prof. Dr. Erdal Çayırcı

Sunday, 19 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Wargame Variants	Prof. Dr. Erdal Çayırcı

Break (10 minutes)		
09:00–09:50	Types of Wargames • Seminar • Matrix • Turn-based Free • Turn-based Rigid	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	In Class-Training: Sample Exercise (Part I) • Disruptive Technology Assessment Wargames	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	In Class-Training: Sample Exercise • Course of Action (CoA) Analysis Wargames	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	In Class-Training: Sample Exercise (Part II) • Disruptive Technology Assessment Wargames	Prof. Dr. Erdal Çayırcı

Monday, 20 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Wargaming Process (Part I) • Introducing the Wargame Cycle	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Wargaming Process (Part II) • Roles, Duties and Responsibilities of Officers	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Wargaming Process (Part III) • Relational Analysis of Teams, Players, and Umpires	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Wargaming Process (Part IV): Collaboration Wargame Process • Stage I: Specification • Stage II: Planning • Stage III: Conducting • Stage IV: Reporting	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Wargaming Process (Part V) Business Process • Phases of Conducting	Prof. Dr. Erdal Çayırcı

Tuesday, 21 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Wargaming Development Process: 1. Scenario Development 2. Objective Analysis 3. MIL Development 4. Database Development	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Wargaming Development Process: 1. Scenario Development 2. Objective Analysis 3. MIL Development 4. Database Development	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		

10:00–10:50	Wargaming Development Process 1. Scenario Development 2. Objective Analysis 3. MIL Development 4. Database Development	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	In Class Training Exercises Sample Exercise-1: NATO Strategic Planning Game	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	In Class Training Exercises Sample Exercise-2: MDIWTC Crisis Response Simulation	Prof. Dr. Erdal Çayırcı

Wednesday, 22 October 2025

Time	Topic	Instructor(s)
08:00–08:50	In-Class Training (Group Work) Sample Exercise 1: Wargame for Education & Training	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	In-Class Training (Group Work) Sample Exercise 2: Wargame for Planning	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	In-Class Training (Group Work) Sample Exercise 3: Wargame for Strategic Decision-Making	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	In-Class Training (Group Work) Sample Exercise 4: Wargame for Tactical/Operational Level Decision-Taking	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Project Assignments for Participants	Prof. Dr. Erdal Çayırcı

Thursday, 23 October 2025

Time	Topic	Instructor(s)
08:00–08:50	Presentation of Assignments (1)	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
09:00–09:50	Presentation of Assignments (2)	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
10:00–10:50	Evaluation of Assignments and Peer Review	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
11:00–11:50	Final Comments & Feedback	Prof. Dr. Erdal Çayırcı
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 103

Course Title

Technology Survey and Emerging Disruptive Technology Assessment

Aim of the Course

This expert-level training course is designed for officers from NATO Bodies, Member Nations, and Partner Countries to identify, monitor, and analyze key technological trends that are shaping the future of the Modelling and Simulation (M&S) domain. In accordance with the rapid pace of technological advancement, the course addresses a wide spectrum of fields that require critical assessment due to their potential as emerging disruptive technologies.

In this context, the course emphasizes the importance of deepening knowledge, expanding expertise, and sharing experience on specific disruptive technologies, including:

- Big Data and Advanced Analytics
- Artificial Intelligence, Augmented Intelligence
- Digital Twins
- Hyperautomation and Autonomy
- Space Technology
- Quantum Technology
- Biotechnologies
- Neurosciences and Human Augmentation
- Hypersonic Technologies
- Advanced Materials and Manufacturing Technologies

Through structured methodologies and hands-on exercises, participants will develop the analytical skills required to evaluate technological developments, assess their implications for NATO M&S capabilities, and contribute to evidence-based capability development and innovation strategies.

Objectives of the Course

This course is specifically designed for military and civilian personnel that are involved in training, capability development, research, experimentation, and innovation. It is structured around two core objectives:

- **Theoretical Knowledge:** Participants will learn the methodology of technology surveying and how to develop Technology Cards as a structured tool for tracking and assessing emerging disruptive technologies. They will learn how to evaluate the relevance of these technologies to NATO M&S capabilities, thereby supporting evidence-based planning, investment, and policy development.

- **Practical Application:** Participants will receive hands-on training to become proficient practitioners in technology assessment. They will engage in a threaded scenario exercise where they prepare a Technology Card and execute all steps of the assessment process.

Expected Learning Outcomes

Upon successful completion of the course, participants will be able to:

- Evaluate how identified technologies may transform NATO M&S capabilities by assessing operational impacts and strategic opportunities.
- Analyze interdependencies between emerging and existing technologies by identifying technical synergies, dependencies, and implementation challenges.
- Apply structured technology watch and foresight methods to monitor the evolution of emerging technologies in the NATO M&S landscape.
- Propose practical and sustainable mechanisms for monitoring technological progress and provide recommendations for NATO M&S capability development.

Instructional Models

- The course offers two training delivery models, both utilizing the *Technology Card Methodology* to teach technology survey and disruptive technology assessment.
- This systematic approach helps participants understand and anticipate the role of emerging technologies in military and civilian domains. The methodology supports estimation techniques and prioritization of technology trends through a structured filtering process. The instructional design emphasizes consensus-based ideation while mitigating groupthink and cognitive bias.
- Participants will evaluate each emerging technology's potential impact on NATO M&S capabilities using this framework.

Module I – Online (ADL Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 27–30 October 2025
Delivery: Online

Module II – Full Residential (R Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)
Dates: 2–6 November 2025
Location: Doha, MDIWTC

Notes

- Sunday marks the start of the official working week.
- Participants will work through a threaded scenario across the module.
- A field visit program is included (subject to confirmation), covering:
  - Qatar University
  - Qatar Foundation

- Qatar Science & Technology Park
- Education City
- Mobility Innovation Center
- Barzan Holding

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)
- Subject Matter Expert (SME) – Guest Speaker (NATO Bodies)

Course's Full Residential Module

Sunday, 2 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Military and Technology Concepts The Generations of Warfare and Technology	Merve Seren
	Break (10 minutes)	
09:00–09:50	Changing Character of Warfare: Hybrid, Mosaic & Cognitive Analyzing Multidimensional and Multidomain Operations	Merve Seren
	Break (10 minutes)	
10:00–10:50	Information, Technology and Transformation: Digital Technology and Blooms Taxonomy	Merve Seren
	Break (10 minutes)	
11:00–11:50	Science and Technology (S&T) and Common Practice: "Disciplines of Science"	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	S&T: "Disciplines of Technology" The Level of Hype and Drivers of Technological Advancement	Alexandru Hudisteanu

Monday, 3 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	S&T Organizations (1): National & International Civilian Science & Technology Organizations	Merve Seren
	Break (10 minutes)	
09:00–09:50	S&T Organizations(2): National & International Military Science & Technology Organizations	Merve Seren
	Break (10 minutes)	
10:00–10:50	S&T Organizations(3): Nongovernmental and Corporate Research	Merve Seren
	Break (10 minutes)	
11:00–11:50	Surveys, Assumptions and Trends: Characteristics of Advanced Military Technologies	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	Identifying Technologies: Emerging, Disruptive, and Convergent (EDT)	Alexandru Hudisteanu

Tuesday, 4 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Impact Assessment Methodology of EDT: Potential Military Impact, Level of Hype, Technology Readiness Level, Time Horizon, Relevance to Capabilities and Military S&T	Merve Seren
	Break (10 minutes)	
09:00–09:50	EDT Impact Assessment(1): Big Data & Advanced Analytics, Artificial Intelligence & Augmented Intelligence and Digital Twins	Merve Seren
	Break (10 minutes)	
10:00–10:50	EDT Impact Assessment(2): Hyperautomation & Autonomy, Space, Hypersonic & Quantum Technologies	Alexandru Hudisteanu
	Break (10 minutes)	
11:00–11:50	EDT Impact Assessment(3): Biotechnologies, Neurosciences and Human Augmentation	SME
	Break (10 minutes)	
12:00–12:50	EDT Impact Assessment(4): Advanced Materials and Manufacturing Technologies	SME

Wednesday, 5 Nov 2025

Time	Topic	Instructor(s)

08:00–08:50	Forecasting and Wargaming: EDT Scenario Development Briefing on Modeling and Simulation	Merve Seren
Break (10 minutes)		
09:00–09:50	Tech Card Methodology Structuring and Developing Scenario-based EDT Estimates Data Collection, Processing and Analysis	Alexandru Hudisteanu
Break (10 minutes)		
10:00–10:50	Role Assignments for Tech Cards	Merve Seren
Break (10 minutes)		
11:00–11:50	Simulation Exercise Briefing: Presentations & Peer Feedback	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Briefing on Reporting and Strategic Applications of Tech Cards	Seren & Hudisteanu

Thursday, 6 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Presentations: Groups I & II	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Presentations: Groups III & IV	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Peer Review & Feedback Discussions	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Wrap-Up: NATO Innovation Priorities and Capability Development	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 104

Course Title

Geostrategic Analysis and Foresight (Estimate) Development

Aim of the Course

This expert-level training course is designed for staff officers, strategic planners, analysts, and decision-makers from NATO Bodies, Member Nations, and Partner Countries. It aims to enhance their knowledge, expertise, and practical skills in geostrategic analysis and foresight development.

The course is structured to equip participants with the necessary knowledge, methodologies, and analytical tools to identify, monitor, and assess current and emerging geostrategic trends. The ultimate goal is to develop foresight estimates that support strategic planning and organizational transformation.

Through structured methodologies, scenario-based exercises, and Hymots®g user training, participants will develop key analytical competencies, including:

- Evaluating historical developments that shape current geopolitical contexts,
- Gaining insight into contemporary dynamics,
- Anticipating future geostrategic themes,
- Identifying and measuring future dynamics and their implications for national power instruments,
- Producing, developing and analyzing comprehensive Geostrategic Foresight Estimates.

Objectives of the Course

This course is specifically tailored for both military and civilian personnel involved in training, research, experimentation, capability assessment, defense planning, and strategic-level policymaking.

Participants will be introduced to the Instruments of Power, commonly referred to as DIMEFIL: “Diplomacy”, “Information”, “Military”, “Economics”, “Finance”, “Intelligence”, and “Law Enforcement”.

The next instructional module focuses on the assessment of State Vectors, using the PMESII framework: “Politics”, “Military”, “Economics”, “Society”, “Information”, as well as “Physical Environment”, “Time”.

Building upon this foundation, participants will develop the ability to:

- Conduct specialized and operational domain analyses using the PMESII framework,
- Assess potential response options across the DIMEFIL domains,
- Integrate and model state vectors and instruments of power as prerequisites for generating and presenting geostrategic foresight products.

The course is structured around two primary learning objectives:

- **Theoretical Knowledge:** Participants will learn the methodology and processes of reviewing and revising Geostrategic Foresight Estimates. As a structured tool for analyzing past, present, and future settings of strategic environments, this course introduces key geostrategic metrics and parameters essential for defense planning and policy development.

- **Practical Application:** Participants will receive hands-on training to become proficient practitioners in geostrategic analysis and foresight development. A key component of the practical module includes participation in a threaded scenario exercise, during which participants will prepare a Geostrategic Trend Card and execute all phases of the geostrategic assessment process.

- **Modeling & Simulation:** In addition, participants will receive user training on Hymots®g which is a specialized software designed to model the evolution of geostrategic environments involving both state and non-state actors. The system enables the definition and simulation of various conflict scenarios, including hybrid warfare, grey zone conflicts, and economic/trade wars. The primary output of Hymots®g is a dynamic world map, where all state and non-state actors are visualized along with their values for: 11 Strategic Instruments, 41 instrument-related parameters, and a wide range of scenario-specific variables. Hymots®g is specifically designed to support the analysis and assessment of the consequences of detected or projected geostrategic scenarios (i.e. incidents or crises) in the short- to medium-term horizon.

Expected Learning Outcomes

Upon successful completion of the course, participants will be able to:

- Understand the interdependencies across PMESII domains and analyze complex data sets using state-of-the-art visualization tools, while evaluating alternative options and anticipating both intended and unintended consequences of strategic decisions;
- Generate tailored situational awareness products to support decision-makers in understanding the evolving security environment;
- Integrate and apply the most up-to-date data sources to maintain analytical relevance and dynamism over time;
- Identify recurring patterns across multiple domains, thereby enhancing assessments aimed at determining adversary intentions and strategic objectives;

- Detect and interpret anomalies within routine patterns, including the identification and early warning of hybrid threats;
- Conduct specialist and operational domain assessments using structured analytical methodologies;
- Formulate potential response options across the DIMEFIL spectrum;
- Visualize and evaluate the impact of strategic decisions to extract strategic-level lessons learned or conduct comprehensive post-exercise/crisis analyses;

Instructional Model and Module Agenda

This course is delivered through three integrated training modules, offering both theoretical foundations and practical applications tailored to strategic-level analysis.

Foundational Learning Module (Strategic Concepts &Frameworks)

The instructional design follows a systematic approach that introduces participants to core analytical frameworks, including State Vectors (PMESII), Instruments of Power (DIMEFIL), and the Strategic Defense Review (SDR) process. This module builds the foundational knowledge necessary for subsequent modeling and foresight exercises.

Geostrategic Trend Card Methodology:

In this module, participants are trained in the Geostrategic Trend Card Methodology, which enables the modeling of PMESII and DIMEFIL structures and the development of geostrategic foresight estimates. This methodology supports structured estimation techniques and prioritization through a trend filtering process. Participants will evaluate geostrategic trend cards, develop forecasts, and discuss the potential implications for NATO capabilities and strategic planning.

Hymots®g User Training:

The third module provides training on the Hymots®g software, a powerful tool for simulating geostrategic environments. It enables participants to analyze PMESII interdependencies and generate data-informed DIMEFIL responses to deter or counter adversary actions. The system supports geostrategic foresight by:

- Visualizing the evolving global security environment,
- Modeling the actions of state and non-state actors,
- Supporting scenario-based analysis of hybrid threats, grey zone conflicts, and strategic competition.

Hymots®g is designed to support a range of strategic-level processes, including:

- Strategic foresight development,
- Crisis detection and early warning,
- Situational appreciation,
- Response option generation.

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 10–13 November 2025
Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)

Dates: 16–20 November 2025
Location: Doha, MDIWTC

Notes

- Sunday marks the start of the official working week.
- Participants will follow a threaded scenario across all modules.
- The course includes both hands-on classroom training and software-based user instruction with hymots®g.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)
- Subject Matter Expert (SME) – Guest Speaker (NATO Bodies)

Course's Full Residential Module

Sunday, 16 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Introduction to Strategic Concepts &Frameworks: Geography/ Geostrategy/Geopolitics	Merve Seren
	Break (10 minutes)	
09:00–09:50	Instruments of Power: DIMEFIL Projection of Power: Hard, Soft, Smart and Sharp	Merve Seren
	Break (10 minutes)	
10:00–10:50	DIMEFIL: Diplomacy, Politics, Information	Merve Seren
	Break (10 minutes)	
11:00–11:50	DIMEFIL: Military, Economics, Finance	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	DIMEFIL: Intelligence, Law Enforcement	Alexandru Hudisteanu

Monday, 17 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	State Vectors: PMESII Politics, Military, Economics, Society, Information Physical Environment and Time	Merve Seren
	Break (10 minutes)	
09:00–09:50	PMESII Modeling: Geostrategic Metrics and Parameters	Merve Seren
	Break (10 minutes)	
10:00–10:50	Scenario-Based Strategy Samples	Merve Seren
	Break (10 minutes)	
11:00–11:50	Calculating Strategy Outcomes: Scenarios & Outcomes	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	Calculating Strategy Outcomes: Scenarios & Outcomes	Alexandru Hudisteanu

Tuesday, 18 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Geostrategic Metrics: Instruments & State Vector	Merve Seren
	Break (10 minutes)	
09:00–09:50	Geostrategic Foresight Estimate	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Geostrategic Foresight Process	Alexandru Hudisteanu
	Break (10 minutes)	
11:00–11:50	Contemporary Setting and Scenarios: Strategic Modeling Examples Using hymots®g	Merve Seren
	Break (10 minutes)	
12:00–12:50	Future Setting and Scenarios: Scenario-Based Strategy Simulations in hymots®g	Merve Seren

Wednesday, 19 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Geostrategic Trend Card Methodology Contemporary and Future Settings	Merve Seren
	Break (10 minutes)	
09:00–09:50	Structuring and Developing Trend Cards: Trends+ Scenarios+ Impact+ Attention+ Status+ Horizon	Alexandru Hudisteanu

	Relevance & Attention	
Break (10 minutes)		
10:00–10:50	Role Assignments for Geostrategic Scenarios	Merve Seren
Break (10 minutes)		
11:00–11:50	Simulation Exercise Briefing: Presentations & Peer Feedback	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Briefing on Reporting: Scenarios & Outcomes Strategic Applications: Current and Future Scenarios	Seren & Hudisteanu

Thursday, 20 Nov 2025

Time	Topic	Instructor(s)
08:00–08:50	Presentations: Groups I & II	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Presentations: Groups III & IV	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Peer Review & Feedback Discussions	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Conclusions and Recommendations	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 105

Course Title

Computer Assisted Experimentation on Defense Plans

Aim of the Course

This expert-level training course is designed for staff officers, strategic planners, defense analysts, and decision-makers from NATO Bodies, Member Nations, and Partner Countries. It aims to enhance their knowledge, analytical skills, and practical expertise in defense planning and experimentation. The course equips participants with the necessary methodologies, conceptual frameworks, and software tools to identify, observe, and assess current and emerging trends in defense planning.

The course is structured around three overarching goals. The first goal is to develop a comprehensive “understanding of the global security landscape”. Participants will gain insight into how different threat perceptions and planning paradigms have evolved over time. They will learn to contextualize defense scenarios within historical and contemporary strategic environments by identifying the concepts, constraints, and outcomes that have shaped decision-making processes.

The second goal is to introduce the “Defense Planning Process” (DPP) which serves as a foundational framework for supporting defense planning at the tactical, operational, and strategic levels. Through this training, participants will gain critical insight into how the DPP enhances military awareness, preparedness and readiness by aligning national and alliance priorities, and enables coherent force development and capability planning.

The third goal is to apply computer-assisted experimentation using Hymots®d software. Through hands-on application of Hymots®d, participants will learn to explore how technological tools can support decision-making in volatile, uncertain, complex, and ambiguous environments. Hymots®d will teach participants to model dynamic scenarios, test assumptions and evaluate the outcomes and constraints of defense planning processes in order to enhance deterrence, agility, modularity, flexibility and adaptability.

Expected Learning Outcomes

This course is specifically tailored for both military and civilian personnel engaged in training, research, experimentation, capability assessment, defense planning, and strategic-level policymaking.

Through structured methodologies, scenario-based exercises, and Hymots®d user training, participants will develop essential analytical competencies and practical skills. These include:

- Learn the Defense Planning Process (DPP) and Strategic Defence Review (SDR)
- Case Studies: NATO Defence Planning Process, Qatar SDR
- Settings and Scenarios for Defense Planning Experimentation
- Example Scenarios for Defense Planning (Warfare, Hybrid/Non-Linear, and Crisis Categories)
- Experimentation for Defense Plans
- Learn Mathematical Programming and Optimization
- Understand how to develop an optimized list of capabilities during defense planning
- Understand the dynamics of sensitivity analysis when developing the final list of capabilities

Instructional Model

The course is structured around three integrated training modules, offering both theoretical foundations and practical applications.

Theoretical Knowledge

Participants will learn the steps and methodology of developing and reviewing DPP, and SDR. In the first section, the participants will be introduced to the steps of the DPP. The DPP includes five steps:

1. Establish political guidance
2. Determine requirements, including Minimum Capability Requirements (MCR)
3. Apportion requirements and set targets
4. Facilitate implementation
5. Review results

On the other hand, participants will be trained on the Strategic Defence Review (SDR), which includes:

1. Recognizing the main implications of the SDR
2. Identifying why a strategic context is paramount to driving the SDR process
3. Identifying the national level of ambition

The second theoretical training will focus on Mathematical Programming and Optimization. In this regard, as a structured methodology, participants will learn:

- Linear Programming
- Matrix Multiplication
- Sensitivity Analysis
- The Simplex Method for Maximization and Minimization

Practical Application

Participants will engage in hands-on training sessions aimed at building practical proficiency in applying the DPP. Key activities include:

Syndicate Work: A key component of the practical module includes participation in a Syndicate Work, during which participants will be asked to establish a Political Guidance with a particular focus on the following 5-6 years, but also providing guidance for national defence planning efforts across all planning domains over the medium term and informing efforts focused on the long term.

Optimization Exercises: Additional hands-on training will focus on applying optimization methods using Excel-based tools. Participants will engage in practical exercises such as optimizing targeting solutions or determining acquisition priorities for military capabilities, using the mathematical programming techniques introduced earlier.

Modeling & Simulation: Hymots®d User Training

The final module provides training in the use of Hymots®d, a static and deterministic computer simulation tool specifically designed to support defense planning. The system enables the identification of optimal military capability sets needed to counter enemy threats within scenario-based contexts.

The military capability requirements are selected from a predefined capability set and are optimized according to the criteria and constraints specified by the user. The optimization is achieved through the Simplex Method. Hymots®d also supports analysts with a Sensitivity Analysis Module, allowing users to evaluate how changes in variables may impact the outcome.

Module Agenda

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 24–27 November 2025
Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)
Dates: 30 November–04 December 2025
Location: Doha, MDIWTC.

Notes

- Sunday marks the start of the official working week.
- Participants will generate follow a threaded scenario across all modules.
- The course includes both hands-on classroom training and software-based user instruction with hymots®d.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)
- Subject Matter Expert (SME) – Guest Speaker (NATO Bodies)

Course's Full Residential Module

Sunday, 30 November 2025

Time	Topic	Instructor(s)
08:00–08:50	Defense Planning: Conceptual and Institutional Framework	Merve Seren
	Break (10 minutes)	
09:00–09:50	Defense Planning Process (DPP): Introducing Flow Diagram	Merve Seren
	Break (10 minutes)	
10:00–10:50	DPP Step-1: Establish Political Guidance DPP Step-2: Determine requirements	Merve Seren
	Break (10 minutes)	
11:00–11:50	DPP Step-2: Determine requirements (continue) DPP Step-3: Apportion Requirements and Set Targets	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	DPP Step-4: Facilitate Implementation DPP Step-5: Review Results	Alexandru Hudisteanu

Monday, 01 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Strategic Defence Review (SDR): Strategic context Implications and Guidance for Defence Planners Level of Ambition	Merve Seren
	Break (10 minutes)	
09:00–09:50	NATO Defence Planning Process NATO Strategic Concept Strategic Foresight Analysis (SFA)	Merve Seren
	Break (10 minutes)	
10:00–10:50	Analyzing Qatar's SDR Process Qatar Vision 2030 Strategic Bulletin 2023 Strategic Foresight Estimate	Merve Seren
	Break (10 minutes)	
11:00–11:50	Individual/Collective Training & Exercise Lessons Identified Lessons Learned (LILL)	Alexandru Hudisteanu
	Break (10 minutes)	
12:00–12:50	Syndicate Work	Alexandru Hudisteanu

Tuesday, 02 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Defense Planning Process: Setting & Scenario: Pre-Cold War Period Cold War Period Post Cold War Perio	Merve Seren
	Break (10 minutes)	
09:00–09:50	Example Scenarios for Defense Planning: Warfare Hybrid / Nonlinear Crises	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Experimentation for Defense Plans	Alexandru Hudisteanu
	Break (10 minutes)	
11:00–11:50	Mathematical Programming Linear Programming	Merve Seren

	Matrix Multiplication Sensitivity Analysis	
Break (10 minutes)		
12:00–12:50	Defining Objectives Defining Constraints Examples	Merve Seren

Wednesday, 03 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Simplex Method: Step 1 Step 2 Step 3 Step 4	Merve Seren
Break (10 minutes)		
09:00–09:50	Simplex Method: Step 5 Step 6 Step 7 Step 8	Alexandru Hudisteanu
Break (10 minutes)		
10:00–10:50	Sample: Maximize Effectiveness Solution in Excel	Merve Seren
Break (10 minutes)		
11:00–11:50	Simplex Method for Minimization and Maximization In-Class Exercise (1): Mathematical Programming in Excel	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Simplex Method for Minimization and Maximization In-Class Exercise (2): Mathematical Programming in Excel	Seren & Hudisteanu

Thursday, 04 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Applied Hymots®d Training (In-Class)	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Hymots®d Practical Session (Users Only)	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Hymots®d Practical Session (Users Only)	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Comments & Feedback	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 106

Course Title

Computer Assisted Experimentation on Concepts and Doctrines.

Aim of the Course

This advanced training course is designed for staff officers, strategic planners, military/defense analysts, and decision-makers affiliated with NATO Bodies, Member Nations, and Partner Countries. It aims to equip participants with a comprehensive understanding of the conceptual, methodological, and institutional dimensions of Concept Development and Experimentation (CD&E) that is an essential instrument in defense planning and capability development.

The course places a strong emphasis on integrating theoretical frameworks with hands-on, computer-assisted applications in order to enable participants to analyze, evaluate, and design future-oriented military concepts and doctrines in a systematic and evidence-based manner.

In this regard, the course emphasizes the critical importance of CD&E in identifying credible, innovative, and operationally relevant solutions to current and emerging capability gaps. Whether the goal is to address tactical deficiencies/shortfalls, adapt to shifting political and strategic conditions, or capitalize on technological and organizational advancements, CD&E serves as a structured and methodological instrument for guiding military adaptation.

Delivered through a curriculum that integrates strategic theory with applied methodology, the course ensures that participants gain both intellectual insight and practical expertise in strategic concepts, experimentation principles, data analysis, and simulation modeling. Participants will acquire the tools necessary to design experiments that are methodologically robust, operationally relevant, and capable of producing measurable outcomes that can inform doctrinal development and defense policy formulation.

By the end of the course, participants will have the ability to design and assess strategic military concepts and doctrines through structured experimentation processes. They will be able to apply advanced analytical methods to develop, test, and refine operational hypotheses using simulation-based tools, and to draw meaningful, actionable insights from experimental results to support both doctrinal innovation and policy decisions. Furthermore, they will be prepared to lead simulation-supported experimentation campaigns that are aligned with institutional priorities and operational goals.

Expected Learning Outcomes

This course is specifically designed for military and civilian professionals involved in defense transformation, capability development, strategic planning, and doctrinal innovation. It is particularly relevant for staff officers, defense analysts, concept developers, and

experimentation planners working within NATO structures, national armed forces of member and partner countries, as well as defense ministries and research institutions. Participants are expected to have a foundational understanding of military planning and operations, as the course builds on advanced methodologies in concept development, military experimentation, and simulation-based assessment. Those engaged in training development, operational analysis, or long-term force planning will particularly benefit from the integrated approach offered in this program, which bridges conceptual thinking with practical application.

By the end of the course, participants will:

- Comprehend the rationale, strategic relevance, and institutional structures supporting concept development in NATO and national systems;
- Develop analytical skills to differentiate between concepts and doctrines, and to assess their roles across strategic, operational, and functional levels;
- Master the concept development process, including its key drivers, paradigms (CD for Transformation and CD for Solution), and enabling mechanisms;
- Acquire practical knowledge of the military experimentation process, including planning, execution, and analysis stages;
- Understand and apply the principles of Design of Experiments, including Design Matrix for Full Factorial Design
- Engage in computer-assisted simulations and learn the phases of simulation, from input/output data handling to the visualization and interpretation of outputs;
- Construct metamodels that enhance understanding of experimental outcomes and support decision-making in capability development;
- Design and execute different types of military experiments, including discovery, hypothesis, validation, and demonstration experiments, tailored to the appropriate audience and objectives;
- Identify and apply the appropriate methods, tools, and roles within an experimentation campaign, with a focus on both wargame and exercise objectives.

Instructional Model

The course is organized around two main components: a theoretical-institutional framework and a practical application module. These parts are designed to complement each other, allowing participants to first build a strong conceptual foundation and then apply what they've learned through structured, hands-on work. The intent is to connect strategic-level thinking with operational tools, ensuring that participants can move confidently between abstract design and practical execution in the field of CD&E.

Theoretical & Institutional Framework

The first part of the course introduces the intellectual and structural foundation of CD&E. It begins with key definitions such as "what a concept is", "how it differs from doctrine", and "how concepts operate at the strategic, operational, and functional levels". Subsequently, the focus shifts to the institutional role of NATO and national structures in shaping and supporting concept development efforts. Participants will then explore the drivers behind concept development: operational needs, defense planning cycles, creative foresight, and

lessons identified from past missions. Special attention is given to two distinct approaches: developing concepts to drive long-term transformation versus creating concepts as immediate solutions to current capability gaps.

The course systematically presents the core methodology of CD&E through its sequential phases. This includes the seven phases of concept development (from pre-initiation to post-approval), the principles that guide experimentation efforts, and the organizational roles involved, in particular the functions of concept developers and experimentation analysts. Participants are introduced to the Discovery, Development, and Validation Processes and to the structure of the Joint Doctrine Development Process.

In this section of the module, Experimentation is covered in depth which covers the types of experiments (discovery, hypothesis, validation, demonstration), their respective levels of maturity, and how each is used in different phases of a campaign. The curriculum outlines how to design and manage experimentation campaigns, structure objectives (across exercises/wargames, and training objectives), assign roles, and interpret outcomes. This part of the course also introduces participants to the logic of experimental design, including how to establish causality, measure outcomes, and ensure that experimentation leads to useful operational feedback. Statistical and modeling tools are introduced which includes confidence intervals, hypothesis testing, regression, correlation analysis, and variance analysis to support informed assessment.

The final sessions in this module focus on simulation and modeling. Participants learn how to plan, conduct, and analyze simulations; manage input and output data; visualize results; and build simple metamodels. Concepts such as Design of Experiments and Full Factorial Design are presented with practical examples to prepare participants for the applied phase of the course.

Practical Application

The second part of the course focuses on applying the theoretical material in realistic, operationally grounded settings. Participants take part in structured and guided assignments for computer-assisted exercises aimed at building expertise in applying CD&E tools and processes.

In practical sessions, participants work individually and in teams to design experiments, build design matrices, conduct hypothesis testing, and interpret simulation results. These exercises are not just technical steps but also connected to doctrinal scenarios and operational problems, ensuring that the learning remains context-driven and relevant.

The assignments are designed to reflect different phases of an experimentation campaign and are assessed based on their methodological framework and practical relevance. Special focus is placed on how participants frame objectives, identify variables, and present conclusions.

Throughout these sessions, instructors provide feedback and guide the learning process to ensure participants become adequate to use the tools and techniques presented earlier. The practical module culminates in a final assignment where participants must demonstrate their knowledge and experience to structure and execute an experimentation flow that responds to a defined operational need.

Module Agenda

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 08 December–11 December 2025
Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)
Dates: 14 December–18 December 2025
Location: Doha, MDIWTC.

Notes

- Sunday marks the start of the official working week.
- Participants will be assigned for computer simulation exercise.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)
- Subject Matter Expert (SME) – Guest Speaker (NATO Bodies)

Course's Full Residential Module

Sunday, 14 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Theoretical and Institutional Framework Definition of Concept Strategic, Operating and Functional Concepts	Alexandru Hudisteanu
Break (10 minutes)		
09:00–09:50	Analyzing Concepts vs. Doctrines Concept Development and Experimentation (CD&E)	Alexandru Hudisteanu
Break (10 minutes)		
10:00–10:50	Flow Diagram: Drivers and Sources of CD (1) Future Oriented Activities Creative Activities Science & Technology	Merve Seren
Break (10 minutes)		
11:00–11:50	Flow Diagram: Drivers and Sources of CD (2) Operational Requirements Defense Planning Lessons Learned	Merve Seren
Break (10 minutes)		
12:00–12:50	Concept Development Paradigms: CD for Transformation CD for Solution	Merve Seren

Monday, 15 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Concept Development Method: Pre-Initiation (1) Initiation (2) Research (3) Development (4)	Merve Seren
Break (10 minutes)		
09:00–09:50	Concept Development Method: Refinement & Validation (5) Approval (6) Post-Approval (7) CD&E Principles	Merve Seren
Break (10 minutes)		
10:00–10:50	CD Enablers & Team: Concept Development, Experimentation, Operational Analysis	Merve Seren
Break (10 minutes)		
11:00–11:50	CD Enablers & Team: Concept Developer Experimenter Analyst	Merve Seren
Break (10 minutes)		
12:00–12:50	Concept Development Processes: Discovery Process Development Process Validation Process	Merve Seren

Tuesday, 16 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Joint Doctrine Development Process Concept Assessment Report Format	SME
Break (10 minutes)		
09:00–09:50	Schematic Overview of the CD&E Lessons Identified Lessons Learned (LILL) Military Experimentation	SME
Break (10 minutes)		
10:00–10:50	Types of Experimentations & Maturity Levels:	SME

	Discovery Experiments (Hypothesis Experiments) Validation Experiments Demonstration Experiments	
Break (10 minutes)		
11:00–11:50	Experimentation Techniques Main Roles in Experimentations	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Experimentation Campaign: Concept Development for Military Capability Package (MCP) Military Experimentation Campaign Implementation and Integration Reporting	Alexandru Hudisteanu

Wednesday, 17 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Military Experimentation Campaign Stages: Specification (1), Planning (2), Conducting (3), Reporting (4)	Merve Seren
Break (10 minutes)		
09:00–09:50	Objectives: Exercise/Wargame & Training Objectives Experiments: Experimentation Campaign & Experimentation Obj. Samples for Objectives	Merve Seren
Break (10 minutes)		
10:00–10:50	Examples for Responses and Factors Example Design Matrix for Full Factorial Design	Alexandru Hudisteanu
Break (10 minutes)		
11:00–11:50	Computer Simulations: Phases of Simulation Input and Output Data Analysis Visualization of the Outputs Metamodels	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Computer Simulations: Applied Training In-Class Assignments for Participants	Seren & Hudisteanu

Thursday, 18 December 2025

Time	Topic	Instructor(s)
08:00–08:50	Practical Session of Assignments (1)	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Practical Session of Assignments (2)	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Evaluation of Assignments	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Comments & Feedback	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 107

Course Title

Computer Assisted Experimentation on Processes.

Aim of the Course

This advanced training course is designed for staff officers, strategic planners, military/defense analysts, and decision-makers affiliated with NATO Bodies, Member Nations, and Partner Countries. Its primary aim is to equip participants with a comprehensive understanding of the conceptual foundations, modeling techniques, and institutional applications of Computer Assisted Experimentation on Processes as critical enablers of defense planning, capability development, and doctrinal transformation.

The course balances theoretical learning with structured hands-on sessions to ensure that participants gain both intellectual insight and practical expertise. Special focus is given to Business Process Model and Notation (BPMN), along with Flow and Gantt Charts and alternative modeling approaches such as UML, data flow diagrams. The main objective of this training is to enable participants to model, simulate, and refine Processes across strategic, operational, and tactical levels.

This training emphasizes the centrality of process models in understanding, optimizing, and managing complex procedural systems within diverse institutional settings:

- Operational design and synchronization
- Joint planning and logistics (e.g., maintenance of air, land, and naval platforms)
- Scenario development and predictive modeling
- Designing and validating Courses of Action (CoAs) for institutional decision-making
- Supporting evidence-based decisions under time constraints and uncertainty

Delivered through a curriculum that integrates simulation-based tools, flowchart logic, and structured experimentation methods, participants will:

- Learn how to model processes with BPMN symbols, structures, and choreography/collaboration models;
- Analyze the completeness and structural integrity of processes (e.g., missing activities, message flows);
- Identify bottlenecks and inefficiencies within complex process environments
- Design multi-layered experimentation scenarios for testing strategic hypotheses
- Present models and recommendations based on simulated outputs and decision points
- Formulate strategies for the institutionalization of modeling outputs within national and NATO-level planning processes, aligned with NATO Architecture Framework and ACT experimentation guidelines.

By the end of the course, participants will be capable of leading simulation-supported experimentation campaigns aligned with institutional goals, crafting process models that are methodologically robust, operationally executable, and capable of supporting evidence-based policy and doctrinal innovation

Expected Learning Outcomes

This course is specifically designed for military and civilian professionals engaged in defense transformation, capability development, strategic planning, and doctrinal innovation. It offers a comprehensive blend of conceptual understanding and operational practice in process modeling.

By the end of the course, participants will:

- Understand the strategic rationale and institutional relevance of process modeling within both NATO and national security frameworks, with emphasis on its role in defense transformation, interoperability, and experimentation.
- Master the conceptual and technical foundations of process modeling, including process classification, categorization, typology, and BPMN symbols, gateways, and modeling logic.
- Apply key modeling techniques, including flowcharts for mapping process logic and structural analysis, Gantt Charts for time-sensitive and sequential processes and other modeling technique like UML, Role Activity Diagrams, Integrated Definition for Function Modelling, Colored Petri Nets.
- Comprehend and implement Business Process Model and Notation (BPMN), with an ability to distinguish and visualize the three core sub-models: Orchestration, Choreography, and Collaboration.
- Develop process models tailored to military applications, such as air, land, and naval maintenance processes with a focus on optimization, cost-efficiency, bottlenecks, and strategic alignment.
- Design and analyze alternative Courses of Action (CoAs) using collaboration and choreography modeling approaches, and simulate their operational implications under various scenarios.
- Understand the conceptual structure of predictive maintenance models and how digital transformation can alter process workflows and cost structures in logistics and sustainment planning.
- Apply simulation-based experimentation to support operational decision-making, including predictive maintenance and crisis planning scenarios.
- Integrate process modeling outputs into institutional decision-support, aligned with NATO Architecture Framework and Allied Command Transformation experimentation initiatives.
- Lead simulation-supported experimentation campaigns, with attention to methodological rigor, audience targeting, and doctrinal or policy feedback mechanisms.

This course ensures that participants not only grasp the methodology of process modeling but also acquire the ability to apply it as a strategic tool in defense planning, experimentation, and operational design.

Instructional Model

The course is structured around two integrated training modules, providing participants with both theoretical foundations and practical applications in process modeling. The structure is designed to enable participants to gain the necessary skills to model, simulate, analyze, optimize and institutionalize complex process frameworks that are relevant to military, intelligence and defense domains with regards to NATO and national defense objectives.

The instructional model focuses on a training framework based on main module objectives:

- Business Process Model and Notation
- BPMN Sub-Models
- BPMN Tools
- Structural Analysis of a Process
- Bottleneck Analysis of a Process

Theoretical & Institutional Framework

The theoretical component of the course introduces the foundational concepts of process modeling and its institutional relevance, particularly within defense and intelligence settings. Participants will explore:

- Conceptual frameworks and institutional expectations in process modeling
- Categories, types and classification criteria of process models
- Alternative process models
- Symbols, logic structures, and interpretation of flowcharts
- Business Process Model and Notation (BPMN)
- Key BPMN Sub-models:
    - Process-Orchestration: Internal process logic (non-executable, executable, public)
    - Choreography: Interactions between participants (pools, choreography tasks)
    - Collaboration: Joint operations such as JISR, TST, and Joint Planning
- Visualization: Events, activities, gateways, control points, choreography objects

This framework is grounded in real-world institutional needs and emphasizes applicability in operational planning, maintenance coordination, and decision support systems.

Practical Application

Participants will engage in intensive hands-on sessions to build operational competency in process modeling and decision analysis. Practical application focuses on simulating military and defense scenarios including:

Key activities:

- Collecting data from process owners
- Developing executable models using BPMN tools
- Conducting validation and verification sessions with stakeholders
- Performing structural, functional, and efficiency analysis
- Generating actionable recommendations and revising models according to the decision by the process owner
- Documenting and presenting final models for evaluation

Application Scenarios:

- Modeling maintenance processes for different units (e.g. Fighter Jet Systems, Tank Units, Naval Corvette Platforms)
- Estimating costs and maintenance efforts
- Designing predictive maintenance models, discuss and analyze potential of the transformation.

Courses of Action (CoA):

- CoA 1: Create distinct collaborations for each entity (Joint Task Force, MoI Entities, Civilian Security), plus one choreography among them.
- CoA 2: Model non-executable internal processes and choreographies for each entity, plus one general choreography for the overall system.
- CoA 3: Integrate all processes as a single collaboration model with centralized coordination.

This part of the instructional model ensures participants can produce operationally relevant, doctrinally meaningful, and methodologically rigorous process models that are ready for adoption and implementation.

Module Agenda

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)

Duration: 4 days (Monday–Thursday)

Dates: 05-08 January 2026

Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training

Duration: 5 days (Sunday–Thursday)

Dates: 11-15 January 2026

Location: Doha, MDIWTC.

Notes

- Sunday marks the start of the official working week.
- Participants will be assigned both in-class training exercises and projects on process modeling for maintenance.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)

Course's Full Residential Module

Sunday, 11 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Conceptual Frameworks and Institutional Expectations: An Introduction to Process Modeling	Alexandru Hudisteanu
	Break (10 minutes)	
09:00–09:50	Categories and Purposes of Process Models	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Classification Criteria and Types of Process Models	Alexandru Hudisteanu
	Break (10 minutes)	
11:00–11:50	Designing and Interpreting Flowcharts: Symbols, Logic, and Process Mapping In Class-Training Exercise	Merve Seren
	Break (10 minutes)	
12:00–12:50	Modeling Time-Sensitive Processes with Gantt Charts: A Tool for Temporal Process Mapping In Class-Training Exercise	Merve Seren

Monday, 12 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Exploring Alternative Process Modeling Techniques (Part 1): ○ Unified Modelling Language (UML) ○ Data Flow Diagrams ○ Role Activity Diagrams	Alexandru Hudisteanu
	Break (10 minutes)	
09:00–09:50	Exploring Alternative Process Modeling Techniques (Part 2): ○ Role Interaction Diagrams ○ Integrated Definition for Function Modelling ○ Colored Petri Nets	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Introducing Business Process Model and Notation (BPMN)	Merve Seren
	Break (10 minutes)	
11:00–11:50	Explaining Three Core BPMN Sub-Models: ○ Processes (Orchestration) ○ Choreographies ○ Collaborations	Merve Seren
	Break (10 minutes)	
12:00–12:50	Visualizing BPMN Sub-Model: Processes (Orchestration) ○ Private non-executable (internal) Business Processes ○ Private executable (internal) Business Processes ○ Public Processes	Merve Seren

Tuesday, 13 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Visualizing BPMN Sub-Model: Processes (Orchestration) ○ Private non-executable (internal) Business Processes ○ Private executable (internal) Business Processes ○ Public (External) Processes	Merve Seren
	Break (10 minutes)	
09:00–09:50	Visualizing BPMN Sub-Model: Choreography	Merve Seren

	○ Pools ○ Processes ○ Choreography	
Break (10 minutes)		
10:00–10:50	Visualizing BPMN Sub-Model: Collaborations ○ Joint Operational Planning Process ○ Joint Intelligence Surveillance and Reconnaissance (JISR) Process ○ Joint Time Sensitive Targeting (TST) Process	Merve Seren
Break (10 minutes)		
11:00–11:50	Visualizing Symbols, Objects & Expression of Terms: ○ Events ○ Activities and Tasks ○ Gateways and Control Points ○ Data Objects and Storages ○ Connecting Objects ○ Choreography Objects	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Visualizing Symbols, Objects & Expression of Terms: ○ Events ○ Activities and Tasks ○ Gateways and Control Points ○ Data Objects and Storages ○ Connecting Objects ○ Choreography Objects	Alexandru Hudisteanu

Wednesday, 14 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Logistics in Process Modeling: Supply & Maintenance	Merve Seren
Break (10 minutes)		
09:00–09:50	Explaining Steps of Project Development on Process Modeling	Merve Seren
Break (10 minutes)		
10:00–10:50	In Class-Training Exercises: Sample 1: Process Modeling for Fighter Jet Maintenance	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	In Class-Training Exercises: Sample 2: Process Modeling for Tank Maintenance Sample 3: Process Modeling for Corvette Maintenance	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Project Assignments for Participants Explaining Course of Actions (CoA) Tips & Recommendation	Seren & Hudisteanu

Thursday, 15 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Presentation of Assignments (1)	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Presentation of Assignments (2)	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Evaluation of Assignments	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Comments & Feedback	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership

Operational Research and Critical Analysis (ORCA) Program

Analysis and Computer Assisted Experimentation (ACE) 108

Course Title

Computer Assisted Experimentation on Capability Packages.

Aim of the Course

This advanced-level course is designed for staff officers, strategic planners, military and defense analysts, and decision-makers affiliated with NATO Bodies, Member Nations, and Partner Countries. Its primary aim is to equip participants with the theoretical foundations, methodological tools, and practical skills necessary to develop, design, integrate, implement, and evaluate military capability packages through computer-assisted experimentation.

By exploring structured defense development models, capability package processes, stakeholder roles and responsibilities, and lifecycle-based frameworks, the course prepares participants to address real-world military scenarios and capability shortfalls aligned with both national defense planning and NATO-level objectives.

The course balances conceptual learning with structured hands-on sessions to ensure that participants gain both intellectual insight and operational proficiency. In this regard, participants will be empowered to simulate, evaluate, and recommend capability options based on data-informed experimentation campaigns conducted at strategic, operational, and tactical levels. Furthermore, they will gain insight into the broader strategic and institutional dynamics that shape the design and delivery of complex defense solutions.

Expected Learning Outcomes

This course is specifically designed for military and civilian professionals engaged in defense transformation, capability development, and strategic planning. It offers a comprehensive blend of conceptual knowledge and practical experience in modeling military capability package processes.

The training approach ensures that participants not only understand the methodology behind capability package development but also gain in-depth insights into the dynamics of developing, implementing, and integrating new capabilities. Additionally, the course enhances participants' skillset to describe capability packages and equips them to apply these tools strategically in defense planning, force development experimentation, operational design, and military transformation initiatives.

By the end of the course, participants will be able to lead simulation-supported experimentation campaigns aligned with institutional goals, whether at the national level or in support of alliance-wide objectives. They will be capable of designing capability package models that are aligned with proven methodologies and executable in operational contexts.

Upon successful completion of the course, participants will be able to:

1. Understand the significance of timely identification of capability targets from short, medium and long-term perspectives.
2. Comprehend the development, design, and delivery processes of military capability packages.
3. Manage the full lifecycle of military capability packages from initiation to disposal stages.
4. Identify the roles and responsibilities of customer, supplier, and user authorities in capability management.
5. Apply the DOTMLPFI framework to describe and design a capability package process.
6. Plan and conduct computer-assisted experimentation to validate capability concepts.
7. Develop a capability reference document and design a supporting experimentation campaign.
8. Execute a wargame or simulation-based testing to support acquisition decisions, including scenarios such as Main Battle Tank, Multi-Mission Aircraft, Maritime Uncrewed Systems, and Next Generation Rotorcraft.

Instructional Model

The course is structured around two integrated training modules, offering participants a comprehensive blend of theoretical foundations and practical applications in military capability package modeling. The design of the course enables participants to acquire the skills needed to model, simulate, analyze, optimize, and institutionalize complex process frameworks relevant to the military, intelligence, and defense domains, particularly with regard to capability targets and military capability packages.

Participants will benefit from the insights and institutional experiences shared by a Subject Matter Expert (SME), who will contribute as a guest speaker from NATO Bodies. This SME perspective will provide participants with a clearer understanding of how NATO defines a capability, the desired characteristics of military capabilities, how new capability targets are adopted by member states, and the approaches used to establish capability targets. The SME will also provide real-world examples illustrating the steps involved in developing and implementing military capability packages.

The course is divided into two primary modules:

1. Capability Package Process
2. Capability Package Description

Approximately 40% of the instructional model focuses on theoretical knowledge. This portion provides participants with structured lectures on military capability package processes, lifecycle phases, and the roles of key organizations. The remaining 60% of the course emphasizes practical application, with a focus on enhancing participants' operational skills through in-class exercises built around sample scenarios.

In addition to these sessions, participants will gain in-depth knowledge on how to design an experimentation campaign. They will also be tasked with designing, developing, and presenting a capability package project based on one of the following acquisition scenarios:

- Main Battle Tank
- Maritime Uncrewed Systems
- Maritime Multi-Mission Aircraft
- Next Generation Rotorcraft

Module Agenda

Module I – Online (ADL Model) or Residential (R Model)

Format: Advanced Distributed Learning (ADL)
Duration: 4 days (Monday–Thursday)
Dates: 19-22 January 2026
Delivery: Online/Res

Module II – Full Residential (FR Model)

Format: In-class training
Duration: 5 days (Sunday–Thursday)
Dates: 25-29 January 2026
Location: Doha, MDIWTC.

Notes

- Sunday marks the start of the official working week.
- Participants will be assigned both in-class training exercises and projects on capability package modeling.
- The SME guest speaker will be announced two weeks prior to the start of the course.

Certification

- Participants who complete either module of the course will receive a formal certification issued by MDIWTC.
- Participants completing Module I (ADL) will receive a Specialist Certificate, delivered in digital format.
- Participants completing Module II (Full Residential) will receive both a Specialist Certificate and a Practitioner Certificate, issued as official hardcopy documents during the closing session.

Instructors

- Assoc. Prof. Merve Seren (Mrs.)
- Alexandru Hudisteanu (Mr.)
- Subject Matter Expert (SME) – Guest Speaker (NATO Bodies, Partner Countries)

Course's Full Residential Module

Sunday, 25 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Conceptual Frameworks and Institutional Expectations: The Purpose of a Capability Package	Merve Seren
	Break (10 minutes)	
09:00–09:50	From Review to Readiness: Revisiting Steps of Strategic Defense Review (SDR) SDR Frameworks & Capability Integration	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Authorities in Capability Management: Capability Requirement Authority (CRA-Customer) Capability Implementer Authority (CIA-Supplier) Capability User Authority (CUA-User)	Subject Matter Expert (SME)
	Break (10 minutes)	
11:00–11:50	Capability Package Development Process: 1. Identification 2. Development	Subject Matter Expert (SME)
	Break (10 minutes)	
12:00–12:50	Capability Package Development Process: 3. Approval 4. Implementation 5. Operation	Subject Matter Expert (SME)

Monday, 26 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Five Steps of Capability Package Process: Step-1: Initiation Stage	Alexandru Hudisteanu
	Break (10 minutes)	
09:00–09:50	Five Steps of Capability Package Process: Step-2: Requirements Stage	Alexandru Hudisteanu
	Break (10 minutes)	
10:00–10:50	Five Steps of Capability Package Process: Step-3: Solution Stage	Merve Seren
	Break (10 minutes)	
11:00–11:50	Five Steps of Capability Package Process: Step-4: Delivery Stage	Merve Seren
	Break (10 minutes)	
12:00–12:50	Five Steps of Capability Package Process: Step-5: In Service & Disposal Stage	Merve Seren

Tuesday, 27 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Capability Package Design: DOTMLPFI Integration	Merve Seren
	Break (10 minutes)	
09:00–09:50	Drafting the Capability Development Document (CDD)	Merve Seren
	Break (10 minutes)	
10:00–10:50	Capability Production Document and Operational Acceptance Planning	Merve Seren

Break (10 minutes)		
11:00–11:50	Stakeholder Coordination and Risk Assessment	Alexandru Hudisteanu
Break (10 minutes)		
12:00–12:50	Procurement Strategy and RFP Development	Alexandru Hudisteanu

Wednesday, 28 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Modeling & Experimentation Planning Data Collection & Analysis for Experimentation	Merve Seren
Break (10 minutes)		
09:00–09:50	In Class-Training Exercises: Sample Exercise-1: WLAN Capability Package	Merve Seren
Break (10 minutes)		
10:00–10:50	In Class-Training Exercises: Sample Exercise-2: Qatar Joint Warfare Training Center Capability Package	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	In-Class Training Group Work: Experimentation Campaign Planning for MBT Selection	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Project Assignments for Participants Main Battle Tank Maritime Uncrewed Systems Maritime Multi-Mission Aircraft Next Generation Rotorcraft	Seren & Hudisteanu

Thursday, 29 January 2026

Time	Topic	Instructor(s)
08:00–08:50	Presentation of Assignments (1)	Seren & Hudisteanu
Break (10 minutes)		
09:00–09:50	Presentation of Assignments (2)	Seren & Hudisteanu
Break (10 minutes)		
10:00–10:50	Evaluation of Assignments and Peer Review	Seren & Hudisteanu
Break (10 minutes)		
11:00–11:50	Final Comments & Feedback	Seren & Hudisteanu
Break (10 minutes)		
12:00–12:50	Certification Ceremony & Group Photo	MDIWTC Leadership