



Curriculum for the International Fall Semester 2019

1. Introduction

1.1 Pre-conditions for Participation in the International Semester:

- Only military **Officer Cadets** – with an appropriate military background – are foreseen to participate in the **entire** International Winter Semester. Exceptions from this rule are to be negotiated on a case-to-case basis.
- The Officer Cadets' pre-conditions for participation in the entire International Semester are:
 - English language according to point 1.2
 - National medical certificate
 - Fulfilling the respective national physical standards of the sending institution.

1.2 Language:

- The entire International Semester is offered in English language.
- The Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 3232 is a requirement for participation.

1.3 Contents/Duration:

- The entire International Semester has 30 ECTS and lasts 4 months. This fulfils the requirements for ERASMUS+ support.

1.4 Applications:

- Applications (use the form of Annex 1) are to be sent to: joachim.herpels@mil.be (in cc to: koen.troch@mil.be).
- Dates:
 - **Latest day of reporting participants: 21st of July, 2019.**
 - The International Semester starts on 26th August 2019 and ends on 20th December 2019.
 - Arrival day: 24th or 25th August 2019 (**not earlier, not later**).
 - Departure Day: to be negotiated on a case-to-case basis after the last classes in December 2019.



- A mixture of countries/institutions causes a better increase of intercultural competences; that is why a **maximum of 4 Cadets per institution** is desirable.
- The procedure for the assignment of places is: **first reported – first booked**.

1.5 Accommodation & Meals:

- According to EMILYO-LoD 5 (framework), accommodation and other expenses in relation to the education are free of charge for members of **European Union** Basic Officer Education Institutions.
- Meals are not free of charge as the restaurant is ran by a private company.

1.6 Permission for Stay

- According to national rules/law, the **permission of stay is to be requested** via the sending institutions' country national (military) diplomatic chain of command.
- A "Request for Visit (RfV)" is to be passed via the sending country's echelons to the sending country's embassy in Belgium.
- **Without this procedure, unfortunately Officer Cadets and civilian students do not receive a permission of stay by the Ministry of Defence and a participation in the international semester is not possible**

1.7 Basic Information

- Participants of the international semester may find useful (administrative) information on our homepage: <http://www.rma.ac.be/en/> and on the EMILYO website (<http://www.emilyo.eu/node/878>)
- In due time a mail will be sent to all participants with the most important necessary information.



2. Contents

2.1 Overview

Class Code	Class	ECTS	Theory	Exercises	Remarks
BS 904	Cultural Dimensions of Operations	3	18	12	
DS902	Defence Economics	3	28	0	
BS907	Citizenship and military ethics	3	20	10	
LS906	Leadership	3	32	0	
EP901	Propulsion of military platforms	3	15	15	
Orientation					
Defence and Security Technology (Module E1)					
TN911	Telecommunications and C4I	3	20	10	
TP912	Management of cybersecurity	3	20	10	
EP915	Applied mechanics	2	11	10	
WS913	Fire control and guided weapons	3	27	0	
SM914	Mechanics of materials and structures	3	20	10	
SM921	Land vehicles propulsion, stability and performance	4	26	14	
SM931	Aircraft propulsion, stability and performance	4	24	18	
SM941	Ship propulsion, stability and performance	4	15	15	
Management Studies for Defence (Module E2)					
DS951	Supply Chain Management	6	40	20	
DS952	Project and program management	6	30	20	Visit: 10
DS953	Performance optimisation	6	30	30	
Security Studies for Defence (Module E3)					
CS961	International conflicts in historical perspective	6	44	10	
CS962	Strategic studies	6	51	0	
CS963	Contemporary security issues	6	48	0	



Week schedule

Timetable	Lundi		Mardi		Mercredi		Jeudi		Vendredi	
	N	F	N	F	N	F	N	F	N	F
1	BS907	BS907	PROM	PROM	LS906	LS906	TEST	TEST	BS907	BS907
2	LOS	EPS	LOS	EPS	LS906	LS906	TEST	TEST	BS907	BS907
3	DS902	DS902	EP901	EP901	EP901	EP901	LS906	LS906	BS904	BS904
4	DS902	DS902	EP901	EP901	EP901	EP901	LOS	EPS	BS904	BS904
5	E1 / E2 / E3	LOS	EPS	E1 / E2 / E3						
6	E1 / E2 / E3	LOS	EPS	E1 / E2 / E3						
7	E1 / E3	E1 / E3	E1 / E2 / E3	E1 / E2 / E3	PROM	PROM	E1 / E2 / E3			
8	E1 / E3	E1 / E3	E1 / E2 / E3	E1 / E2 / E3	PROM	PROM	E1 / E2 / E3			

Available days

Mon 26 Aug - Fri 20 Dec 19

AM (1-2)	15	17	16	16	15
AM (3-4)	15	17	16	16	15
PM (5-6)	16	15	16	16	15
PM (7-8)	16	16	16	16	15

Remarks

1	BS904
2	BS001
3	DR001
4	BS907
5	BS002
6	SC001
7	DS902
8	LS906
9	EP901

2.2 In Detail

Class Title	Common module BS904: Cultural Dimensions of Operations
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 Written evaluation and written exam
Teaching content	The aim of this course is to better understand the complexities of contemporary conflicts and military operations conducted both in remote operational theatres as in homeland operations



Class Title	Common Module DS902: Defence Economics
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class
Evaluation	1 Written evaluation and written exam
Teaching content	<p>In this course, Defence Economics, as a scientific discipline, is examined in its national, European and Atlantic dimensions. Chapter 1 identifies Defence as an external element of Security as a whole and describes its place in the nation's socio-political environment. All subsequent Chapters plunge their roots into the current events and their evolution. The contents presented below are therefore subject to change as events unfold:</p> <ul style="list-style-type: none"> - Chapter II. Defence budgets and expenditures – A historical and prospective analysis - Chapter III. The economic and industrial physiognomy of Defence - Chapter IV. Economic aspects of recent armed operations - Chapter V. The acquisition of Belgian major weapon systems since 2018 - Chapter VI. The Defence economy and industry, new dimensions to the European Union

Class Title	Common Module BS907: Citizenship and military ethics
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 Oral evaluation and oral exam with written preparation or written part
Teaching content	<p>In this course a number of journal articles and book chapters will be studied in the domain of citizenship and military ethics. More specifically, we will be focusing on the following texts:</p> <ul style="list-style-type: none"> - Is Patriotism a Virtue? (MacIntyre) - Targeted Killing: Murder, Combat of Law Enforcement? (McMahan) - Military Ethics of Fighting Terrorism: An Israeli Perspective (Kasher & Yadlin) - Human Shields (Haque) - Just War Theory and the Privatization of Military Force (Pattison) - In Defence of Mercenarism (Fabre) - The Paradox of Riskless Warfare (Kahn) - Moral Predators: the Duty to Employ Uninhabited Aerial Vehicles (Strawser) - The Morality of Autonomous Robots (Johnson & Axinn)



Class Title	Common Module LS906: Leadership
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class
Evaluation	1 Written evaluation and oral exam
Teaching content	<ol style="list-style-type: none">1. Review of the Vision of Defence on Leadership, the different leadership styles and additional leadership models2. Experience briefs young and experienced leaders3. Dilemma training4. Communication skills5. Syndicate Room Discussions leadership cases6. Well-being

Class Title	Common Module EP901: Propulsion of military platforms
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 Written evaluation and written exam
Teaching content	<ol style="list-style-type: none">1. The principles of technical thermodynamics applied to engine cycles (Otto cycle, Diesel cycle and Dual cycle)2. How the two-stroke and four-stroke engine works3. How a turbo engine (turbojet, turbofan, gas turbine) works4. Typical figures/values characterizing contemporary engines (e.g. Compression ratio, specific fuel consumption, maximum temperatures, sizes...)

Class Title	Module E1 TN911: Telecommunications and C4I
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and oral exam
Teaching content	<p>This course introduces the domain of telecommunications and C4I.</p> <p>The following topics are covered:</p> <ul style="list-style-type: none">- Generalities on telecommunications- Spectral analysis- Analogue signals and modulations- Introduction to source coding- Transmission of numerical signals- SatCom



	<ul style="list-style-type: none"> - Tactical Communication Networks - VOIP (Voice Over IP) - EOIP (Everything Over IP) <p>The theoretical concepts are illustrated by examples of civilian systems and applications from the world of defence & security. The concepts are used during the practice sessions (exercises).</p>
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Class Title	Module E1 TP912: Management of cybersecurity
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and oral exam
Teaching content	The contents of this course will be available starting academic year 2019-2020.

Class Title	Module E1 EP915: Applied mechanics
Credits	2
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and oral exam
Teaching content	<ol style="list-style-type: none"> 1. Conservation laws of mass, momentum with a focus on thrust by reaction and energy 2. Dimensional analysis limited to force coefficients, Mach- and Reynolds-numbers 3. Heat exchange (convection, radiation, conduction) 4. Lift and drag forces on bodies <ul style="list-style-type: none"> • Forces coefficients • Dependency on shape, angle, Ma and Re • Polar curves 5. Boundary layer <ul style="list-style-type: none"> • Velocity profile • Laminarity/turbulence • Influence on force coefficients • Boundary layer control 6. Effect of compressibility on the forces <ul style="list-style-type: none"> • Flow tables in compressible flows • Normal/oblique shock • Expansion • Wave drag • Flow over a supersonic wing/fin 7. Fundamentals of flow in nozzles <ul style="list-style-type: none"> • Isentropic cases • Non-isentropic cases



Class Title	Module E1 WS913: Fire control and guided weapons
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class
Evaluation	1 written evaluation and oral exam
Teaching content	<p>In the first part of the course (14 Hr), the four main functions of guided weapons are described; guidance, control, propulsion and warhead. For each function, a classification and an explanation of the working principles are given. A 2DOF trajectory model is developed and examples of launch and intercept envelopes are given.</p> <p>In the second part (13 Hr) NATO trajectory modelling is applied in order to create practical Fire Control Systems. After defining general principles, different aspects such as aiming techniques and weaponeering are analysed for direct and indirect fire applications. Specific weapon systems include small arms, land, air and naval systems.</p>

Class Title	Module E1 SM914: Mechanics of materials and structures
Credits	3 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and written exam
Teaching content	<p>Material families and bonding forces Fundamental aspects of crystal structure and its defects Interaction between microstructure, processing and material properties Mechanical structures External and internal forces on a solid structure Static stress and strain determination Simple and combined loading cases Determination of mechanical properties Failure mechanisms</p>

Class Title	Module E1 SM921: Land vehicles propulsion, stability and performance
Credits	4 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and written exam
Teaching content	Important with respect to land vehicle



	<p>propulsion, stability and performance is the longitudinal, lateral and vertical dynamics of a vehicle. A special attention is drawn of the tires since they represent the physical contact between the road and the vehicle. In the longitudinal dynamics part the propulsion (engine, propulsion equation, connection engine - vehicle) and braking dynamics and technology of a land vehicle will be studied. Also the different important basic components of a vehicle will be studied (clutch, gearbox, propeller shaft, differential...).</p> <p>In the vertical dynamics part the suspension of a vehicle will be studied.</p> <p>In the lateral dynamics part the steering system will be studied together with some basic notions on vehicle handling.</p>
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Class Title	Module E1 SM931: Aircraft propulsion, stability and performance
Credits	4 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and oral exam
Teaching content	<p>This course discusses flight mechanics: the kinematics and dynamics of and around the centre of gravity of an aircraft, which is considered to be rigid. The course consists of:</p> <ol style="list-style-type: none"> 1. Performance: <ul style="list-style-type: none"> - performance in straight and level flight - load factor, manoeuvres in the vertical plane and gusts - manoeuvres in the horizontal plane - energy management - take-off and landing analysis 2. Stability <ul style="list-style-type: none"> - the aerodynamic centre - conditions for longitudinal stability and equilibrium - conditions for lateral and directional stability - interaction between slip, roll, and yaw stability derivatives - control derivatives of roll and yaw control - notions of dynamic stability - coupling with aero elasticity 3. Practical exercises: <p>In the practical exercise sessions students solve problems under supervision. The selected problems are a direct application of knowledge and concepts gained in the lectures.</p>



Class Title	Module E1 SM941: Ship propulsion, stability and performance
Credits	4 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	1 written evaluation and oral exam
Teaching content	<ol style="list-style-type: none"> 1. Static Stability <ul style="list-style-type: none"> • Stability of the floating body • Stability of the intact ship <ul style="list-style-type: none"> – Stability computations – Stability curves • Moving, loading and unloading weights • The problem of mobile cargo • Hull damage • Grounding 2. Dynamic stability <ul style="list-style-type: none"> • The influence of waves • Damping installations 3. Ship resistance <ul style="list-style-type: none"> • The towing tank experiment • Determination of the propulsive power 4. The propulsion system <ul style="list-style-type: none"> • The propeller • Alternative propulsion systems • Sails • Engine types • Some common configurations 5. Ship control <ul style="list-style-type: none"> • The rudder • Course keeping • Rudder configurations

Class Title	Module E2 DS951: Supply chain management
Credits	6 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	2 written evaluations and written exam
Teaching content	<p>Assuring the availability of supplies and the reliability of weapon systems are critical activities for military success. Therefore, this course addresses the following topics.</p> <ol style="list-style-type: none"> 1. Supply chain operations reference model (Plan, Source, Make, Deliver, Return) 2. Logistics management (sourcing, transportation, distribution) 3. MRP II planning (forecasting, SOP, MPS, MRP, CRP, PAC) 4. Inventory control 5. Total productive maintenance <p>The course highlights various mathematical models and approaches that support effective and efficient supply chain and maintenance management.</p>



Class Title	Module E2 DS952: Project and program management
Credits	6 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class, exercises and visits
Evaluation	2 written evaluations and oral exam with written part or written preparation
Teaching content	<p>Defence is an organization that is continuously confronted with unique and new situations. As a result, both our core and supporting activities require effective project management.</p> <p>This course builds on the basis principles of project and program management as described by the Body of Knowledge of the Project Management Institute (PMI).</p> <p>Project Management:</p> <ol style="list-style-type: none">1. Phases: initiation, planning, execution, monitoring, close out2. Core Knowledge areas: Time, budget, scope and quality management3. Supporting Knowledge areas: Procurement, HR, Communication, Risk Management, Integration management <p>Program and portfolio Management within the Belgian Armed Forces:</p> <ol style="list-style-type: none">1. Role of the material manager2. Acquisition processes and integrated logistic support3. Life Cycle Costing <p>Practical sessions provide a profound understanding of time scheduling based on Critical Path Method and PERT. Students are assigned to real life projects to support the creation of an integrated project plan and the use of various templates and software.</p>

Class Title	Module E2 DS953: Performance optimisation
Credits	6 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	2 written evaluations and a written and oral exam
Teaching content	<p>Knowing how to do more with less is a prerequisite for every manager within Defence. Sound decision making is key to optimize the performance of various military services. The content of this course supports these goals in three ways:</p>



	<p>1. Overview of various modern management methods (performance measurement, process and risk management) and change and improvement approaches (ICS, ISO 9000, Lean Six Sigma, Bottleneck Management, Change Management).</p> <p>2. Overview of different quantitative and qualitative decision supporting tools (Spreadsheet modelling, Linear optimisation models, Decision making under uncertainty, Multicriteria decision making).</p> <p>3. Business game that illustrates the integrated character of decisions in organisations. This will illustrate how decisions are the results of both formal and informal information flows that depend on tangible (structure, strategy) and intangible (culture, team dynamics) characteristics of the organisation.</p>
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Class Title	Module E3 CS961: International conflicts in historical perspective
Credits	6 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class and exercises
Evaluation	2 written evaluations, 1 oral evaluation and oral exam
Teaching content	The core business of an officer is conducting operations, both in a national and international context. In order to assess the scope of contemporary conflicts, it is important that he is able to make a correct analysis of the conflict from a historical point of view beforehand. In this course, we will focus hereon and teach the student not only the knowledge, but also the necessary skills to help him with this. We will focus on some specific cases that are relevant for the Belgian Defence. In addition to a thorough analysis of the underlying causes of the Middle Eastern conflict, we will go deeper into the Sahel issue as well as Central Africa.



Class Title	Module E3 CS962: Strategic studies
Credits	6 ECTS
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class
Evaluation	3 written evaluations, 1 oral evaluation and oral exam
Teaching content	<p>Strategy is neither simple nor easy. A good strategy requires a number of skills and competences. A professional need to understand that formulating, articulating, evaluating or executing strategy is not an easy thing. A theory of strategy is not the simple application of a checklist or a cookbook solution that can be applied time after time. Especially in periods of great turmoil and change, the development of strategy becomes rather difficult. This course will help students to get a better understanding of the what, how and why of strategy in a fast changing world, based on the study of a number of great strategists and their approaches.</p> <p>This course provides an analysis of strategy, strategic studies and contemporary strategic issues. It will offer a critical study of war, politics and strategy. The understanding of the relationship between war and politics, strategy and security in international relations is key for junior officers. To understand the way armed forces are used nowadays and why they are deployed as well to understand the complex security environment they will need to work in. Before examining contemporary problems, we will first explore the causes of war, the evolution of modern warfare, as well as strategic theory and culture. Students will finally study the future of strategy.</p>

Class Title	Module E3 CS963: Contemporary security issues
Credits	6
To be covered in	Ma SSMW International Semester and additional participants
Type of Class	Integrated class
Evaluation	2 written evaluations, 2 oral evaluations and oral exam
Teaching content	<p>Junior officers are involved in the conduct and the execution of military operations/tasks in a national and international context. In order to prepare them for these basic functions, they should be well informed about the general framework of these operations and why</p>



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	<p>Belgium makes some political choice within the framework of its foreign and defence policy.</p> <p>This course explores some of the world's most pressing and interesting political security issues that have an influence on the international environment in general and on the Belgian Security & Defence Policy in particular. After a short revision of the international relations basics, cadets will first get acquainted with the Belgian foreign, security and defence policy. In a second step, they will get information on the global risks and challenges threatening the world in general and Belgian particularly. Finally, cadets will analyse the links between contemporary security issues and the Belgian foreign and security policy according to the Belgian Defence strategic vision 2030 that identifies our European southern periphery and our European northern and eastern flank as our major security concerns.</p>
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Annexes:

Annex 1: Application Form

Annex 2: Request for Visit

Remark: You can download the Application Form and the Request for Visit as a Word-document from: <http://www.emilyo.eu/node/878>