



**University of Zagreb**  
Trg Republike Hrvatske 14, HR-10000 Zagreb



**Croatian Defence Academy "Dr. Franjo Tudman"**  
Ilica 256b, HR-10000 Zagreb

**ECTS Information Package for Academic Year**  
**2023/2024**  
Course Catalogue – Graduate Study



<https://vojni.unizg.hr/>

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December, 2023

ECTS Information Package  
for Academic Year 2023/2024  
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University of Zagreb  
Trg Republike Hrvatske 14, HR-10000 Zagreb

Croatian Defence Academy "Dr. Franjo Tuđman"  
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<https://vojni.unizg.hr/>

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Ministry of Defence of the Republic of Croatia

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Croatian Defence Academy "Dr. Franjo Tuđman"

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## Introduction



Prof. Stjepan Lakušić, Ph.D.

Rector of the University of Zagreb



Brigadier Slaven Zdilar, Ph.D.

Commander of the Dr. Franjo Tuđman Croatian Defence Academy

The University of Zagreb, together with its constituents and the Dr. Franjo Tuđman Croatian Defence Academy, participates in the execution of the Military Leadership and Management and Military Engineering study programmes. The great interest shown by the candidates confirms the quality of the programmes. It also obliges us to develop new study programmes and ensure the quality of the existing ones in accordance with the European and world standards.



Prof. Tomislav Josip Mlinarić, Ph.D.

Vice-Rector for Innovation, Technology Transfer, and Cooperation with the Economy, University of Zagreb



Prof. Boris Brkljačić, Ph.D.

Vice-Rector for Students, Undergraduate, and Graduate Studies, University of Zagreb



Brigadier Associate Prof. Andrija Kozina, Ph.D.

Dean of the Croatian Military Academy "Dr. Franjo Tuđman"

Attendance of these programmes is primarily intended for cadets who have successfully completed the undergraduate level of education and earned the vocational title of Bachelor of Military Engineering or Bachelor of Military Leadership and Management. Earning the vocational title of Master of Military Engineering or Master of Military Leadership and Management, after completion of the graduate studies, is a significant move forward in the academic development of future officers. That is a pathway that will enable them to widen their insights and to specialize further in fields important for the military organization.



Prof. **Tatjana Gazivoda Kraljević**, Ph.D.  
 Head of the University Graduate Program  
 Military Engineering,  
 Faculty of Chemical Engineering and Technology  
 University of Zagreb



Prof. **Goran Đukić**, Ph.D.  
 Head of the University Graduate Program  
 Military Leadership and Management,  
 Faculty of Mechanical Engineering and Naval Architecture  
 University of Zagreb

Our goal is to educate officers who will possess competencies, capabilities and skills that are indispensable for response to threats and crises. Furthermore, with such approach, we will contribute to continued development of the Croatian army and we will also upgrade the level of readiness of the entire system for providing assistance to civilian society and to conduct of operations abroad.



Brigadier Associate Prof. **Mladen Viher**, Ph.D.  
 Head of the Graduate University Program at HVU  
 Military Engineering,  
 Dr. Franjo Tuđman Croatian Defence Academy



Brigadier Associate Prof. **Andrija Kozina**, Ph.D.  
 Head of the University Program at HVU  
 Military Leadership and Management,  
 Dr. Franjo Tuđman Croatian Defence Academy

# **Study programme**







# Graduate Study Programme in Military Engineering

Qualification awarded: Master of Military Engineering  
(univ. mag. ing. milit.)

| 1st semester, 1st year |  |           |                  |      |  |
|------------------------|--|-----------|------------------|------|--|
| ECTS                   | Required courses   | Eng. Lev. | Study Hours      | Sem. |  |
| ME 6.0                 | Computer Simulations and Modelling (188516)<br>Đukić, G.   | Lo        | 75<br>(30+0+45)  | I    |  |
| ME 3.0                 | Fundamentals of Strategy (188519)<br>Akrap, G.; Čutić, D.  | Lo        | 45<br>(30+15+0)  | I    |  |
| ME 6.0                 | Operational Research (188515)<br>Đukić, G.   | Lo        | 75<br>(45+0+30)  | I    |  |
| ME 3.0                 | Planning and Managing Defence Resources (188514)<br>Fabac, R.; Čutić, D.   | L1        | 45<br>(30+15+0)  | I    |  |
| ME 3.0                 | Training Management (188504)<br>Matika, D.; Fabac, R.  | Lo        | 45<br>(30+0+15)  | I    |  |
| ECTS                   | Elective courses (16673)   | Eng. Lev. | Study Hours      | Sem. |  |
| ME 3.0                 | Organization of the Health Care Service (188521)<br>Zdilar, B.; Čuković Bagić, I.                                | Lo        | 45<br>(30+5+10)  | I    |  |
| ECTS                   | Elective group of compulsory subjects (16682)  | Eng. Lev. | Study Hours      | Sem. |  |
| ME 6.0                 | Contemporary Methods of Analysis and Establishing Chemical Compound Structure (188518)<br>Mutavdžić Pavlović, D. | L3        | 75<br>(30+15+30) | I    |  |
| ME 6.0                 | Mechatronics (188517)<br>Šitum, Ž.; Hrgetić, M.  | L1        | 75<br>(30+45+0)  | I    |  |
| 2nd semester, 1st year |  |           |                  |      |  |
| ECTS                   | Required courses   | Eng. Lev. | Study Hours      | Sem. |  |
| ME 15.0                | Diploma thesis (188528)  | L3        | 225<br>(0+0+225) | 2    |  |
| ME 4.0                 | Fundamentals of Branch and Service Employment (188522)<br>Viher, M.; Vrček, N.                                   | Lo        | 60<br>(30+0+30)  | 2    |  |
| ME 3.0                 | Homeland War (188524)<br>Cipek, T.; Matić, Z.  | L1        | 45<br>(30+15+0)  | 2    |  |
| ME 5.0                 | Military Systems and Processes Quality Management (188525)<br>Runje, B.; Jakopčić, M.                            | Lo        | 60<br>(30+0+30)  | 2    |  |
| ME 3.0                 | Selection and Behaviour of Materials in Exploitation (188527)<br>Alar, Ž.; Jakopčić, M.                          | L3        | 45<br>(30+0+15)  | 2    |  |

# Graduate Study Programme in Military Leadership and Management

Qualification awarded: Master of Military Leadership and Management  
(univ. mag. art. milit.)

| 1st semester, 1st year  |      |  |           |                  |      |
|---|------|--|-----------|------------------|------|
|   | ECTS | Required courses   | Eng. Lev. | Study Hours      | Sem. |
|    | 6.0  | Computer Simulations and Modelling D (188532)<br>Đukić, G.                           | Lo        | 75<br>(30+0+45)  | I    |
|    | 6.0  | Contemporary Military Concepts (188529)<br>Mikac, R.; Kozina, A.                     | L1        | 75<br>(45+0+30)  | I    |
|    | 3.0  | Crisis Management (188531)<br>Mikac, R.; Dobrović, Ž.                                | Lo        | 45<br>(30+0+15)  | I    |
|    | 3.0  | Fundamentals of Strategy (188519)<br>Akrap, G.; Čutić, D.                            | Lo        | 45<br>(30+15+0)  | I    |
|    | 3.0  | Planning and Managing Defence Resources (188514)<br>Fabac, R.; Čutić, D.             | L1        | 45<br>(30+15+0)  | I    |
|    | 3.0  | Training Management (188504)<br>Matika, D.; Fabac, R.                                | Lo        | 45<br>(30+0+15)  | I    |
|   | ECTS | Elective courses (16672)   | Eng. Lev. | Study Hours      | Sem. |
|  | 3.0  | Intelligence Analytics (188534)<br>Malnar, D.  | L3        | 45<br>(30+0+15)  | I    |
|  | 3.0  | Logistics Support (188533)<br>Kozina, A.; Đukić, G.                                  | Lo        | 45<br>(30+0+15)  | I    |
|  | 3.0  | Organization of the Health Care Service (188521)<br>Zdilar, B.; Čuković Bagić, I.    | Lo        | 45<br>(30+5+10)  | I    |
| 2nd semester, 1st year  |      |  |           |                  |      |
|   | ECTS | Required courses   | Eng. Lev. | Study Hours      | Sem. |
|  | 5.0  | Command and Control (188535)<br>Kliček, B.; Kozina, A.                               | Lo        | 60<br>(30+0+30)  | 2    |
|  | 15.0 | Diploma thesis (188528)  | L3        | 225<br>(0+0+225) | 2    |
|  | 4.0  | Fundamentals of Branch and Service Employment (188522)<br>Viher, M.; Vrček, N.       | Lo        | 60<br>(30+0+30)  | 2    |
|  | 3.0  | Security and Force Protection (188536)<br>Akrap, G.; Gracin, D.                      | Lo        | 45<br>(30+0+15)  | 2    |
|   | ECTS | Elective courses (16675)   | Eng. Lev. | Study Hours      | Sem. |
|  | 3.0  | Contemporary CBRN Threats and Toxicological Consequences (188539)<br>Vučemilović, A. | L2        | 45<br>(30+15+0)  | 2    |
|  | 3.0  | Quartermaster Corps (188537)<br>Mihanović, L.; Fabac, R.                             | L1        | 45<br>(30+0+15)  | 2    |
|  | 3.0  | Transport Service (188538)<br>Mihanović, L.; Stanković, R.                           | Lo        | 45<br>(30+0+15)  | 2    |

# **Courses**

# Command and Control

188535



## Lecturers



prof. dr. sc.  
Božidar Kliček



doc. dr. sc.  
Andrija Kozina

ECTS Credits 5.0

English Level Lo

E-learning Level L1

Study Hours

Lectures 30

Exercises 30

Associate Lecturer

Tomislav Fabijančić

Teaching Assistant

Krešimir Sudarić

## Grading

- Participation in class, practical work and individual and group assignments: 40 % - Two preliminary exams: 20% (each) - Knowledge displayed at the final written exam: 20%

## Course Description

Acquisition of basic knowledge and skills that can be used in command as a philosophy of commanding and combat function in current national and multinational operations. By studying the subject cadets will widen their understanding of the mission command structure, its principles and the role of the commander who applies it in manoeuvre approach to operations. During the course, the language of mission commanding is used and the way of its application in planning, directing, coordinating and controlling of the forces and operations during the operations is discussed. Students will develop specific competencies in exercise sessions and their individual work, according to their abilities.

## Study Programmes

» Military Leadership and Management (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Compare the authority of the commander and NATO command relations
2. Distinguish between commanding as a combat function and command philosophy
3. Compare the command concepts (mission command and detailed command)
4. Explain the principles of command
5. Explain the role of the commander in the operational process (understanding, visualization, description, guiding and assessment of the operation)
6. Compare the relation between command and implementation of control
7. Explain and apply knowledge management and information management
8. Explain the role of the staff and the organization of the command post at a company/battalion level
9. Explain the role of CIMIC in operations
10. Explain the role of religious support in operations

## Study Programme Learning Outcomes

### Screening of student's work

2 ECTS Midterm exam

1 ECTS Written exam

2 ECTS Practical work

5 ECTS

## Forms of Teaching

### » Lectures

» Lectures are performed in classroom using power point presentations and videos in support of the teaching material.

### » Exercises

» After each lecture, exercises are conducted to better identify theoretical material using specific scenarios, videos, graphics and maps.

## Week by Week Schedule

1. Introduction to Command and Control, 2 hours (Introductory lecture, 1 hour): Getting acquainted with the course, the course teacher and instructors; getting acquainted with the dynamics and lecture content, terms and obligations of the attendees as well as with the evaluation and grading systems. Nature of Command and Control 1 (Operational areas, combat functions and combat power, use of combat power through the implementation of NATO tactical activities, definition of command at tactical and joint levels, relationship between the command and control)
2. The Effect of the Environment on Command Implementation, 2 hours (people, lack of safety, time and space, ground force operations, logistics, information, technology)
3. Command Concepts, 2 hours (mission command and detailed command)
4. Elements of Command, 2 hours (authority and NATO Command Relationships, decision making, art of command, leadership and control)
5. Principles of Command, 2 hours (development of cohesive teams through mutual trust, establishing mutual understanding, issuing a clear commander's intent, implementation of mission command and acceptance of reasonable risks)
6. Commander and Operational Process, 2 hours (understanding the environment and defining the problem – operational variables and mission variables)
7. Preliminary exam 1
8. Commander and Operational Process, 2 hours (operation visualization – operational approach to the operation)
9. Commander and Operational Process, 2 hours (describing and guiding the operation – defined problem, commander's guidelines, commander's intent, commander's requirements for critical information)
10. Commanding During the Operation, 2 hours (position and presence of the commander, command organization and control methods)
11. Commander's role in Command Execution, 2 hours (creation of positive command climate, training of subordinates in command and control)
12. Command in the Croatian Armed Forces, 2 hours (structure of the CAF, levels of authority and command organization in operations at strategic, operational and tactical levels, command powers in the armed forces)
13. Command Support, 2 hours (role, deployment and design of command support)
14. Command posts, 2 hours (organization and types of command posts at company/battalion levels)
15. Preliminary exam 2

## Literature



Dimitriev, Fabijančić (2019).  
Zapovijedanje, MORH



*Interni nastavni materijali  
dostupni na sustavu e-učenja,  
GS OS RH*

## Similar Courses

» Vojni stožeri i planiranje operacija, Oxford

# Computer Simulations and Modelling

188516



## Lecturer



prof. dr. sc.  
Goran Đukić

|                  |     |
|------------------|-----|
| ECTS Credits     | 6.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Exercises        | 45  |

## Associate Lecturers

Hrvoje Cajner  
Miro Čolić  
Darko Landek

## Teaching Assistants

Tihomir Opetuk  
Ivan Putnik

## Grading

Obligatory attendance of lectures and exercises. 2 midterms or written final exam. The final grade of the exam is determined by two grades or written exams.

## Course Description

Acquisition of knowledge on different modeling and simulation methods, development of simulation models and their application in realistic military, technical and organizational systems. Multidisciplinary approach to modeling and simulations. Dissemination of acquired knowledge by applying different simulation tools. Theory and practice of application of commercial computer tools to build simulation models. Basics of application of expert systems and systems of artificial intelligence based on data mining and machine learning.

## Study Programmes

» Military Engineering (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Explain the structure and operation of the technical and organizational system (military and civil).
2. Formulate a mathematical or experimental model of production, logistics and organizational systems.
3. Suggest appropriate methods for predicting the characteristics of technical and organizational systems.
4. Apply simulation in solving problems in manufacturing, logistics and organizational systems.
5. Evaluate the chosen modeling method and simulation results in relation to the behavior and properties of the real system.
6. Explain the application of the artificial intelligence method.
7. Choose and apply suitable scenario of events on the battlefield.
8. Evaluate and critically analyze the results of the battlefield simulation.

## Study Programme Learning Outcomes

### Screening of student's work

2.5 ECTS Lectures attendance  
3.5 ECTS Midterm exam  

---

6 ECTS

## Forms of Teaching

- » Lectures
  - » Classical ex cathedra lecture.
- » Exercises
  - » PC lab exercises.
- » Other
  - » Simulation centre - practical work.

## Week by Week Schedule

1. Introduction to systems theory, modeling and simulation  
Definitions and basic elements of technical and organizational systems and processes (military and civil).
2. Tasks and Modeling Objectives.  
Experimental and theoretical models.  
Preparation and development of simulation models.
3. Computer simulations based on analytical and numerical models.  
Verification of computer simulations.
4. Introduction to Game Theory.  
Basic elements, types and strategies of the game.
5. Statistical analysis of the process.  
Statistical modeling and regression analysis.
6. Modeling using Design of Experiments method.
7. Mid term 1
8. Discrete Events Simulation (DES).  
Enterprise Dynamics<sup>10</sup> (ED<sup>10</sup>) and DES objects.  
Connecting DES objects, defining attributes, and managing events.
9. Methodology of DES modelling with examples.  
Trends in DES.
10. Basics of intelligent systems.  
Rule-based expert systems.  
Fuzzy expert systems. (online)
11. Artificial neural networks.  
Basics of genetic algorithms and genetic programming.  
Fundamentals of machine learning and data mining. (online)
12. Simulations in military education and training.
13. The concept and capabilities of the VBS computer system.  
Operator training.
14. JCATS Concept and Capabilities.  
The role of the doctors in the exercise of the exercise.  
The role of the operator and staff of the units in exercising the exercises.
15. Mid term 2

## Literature



D. Landek, H. Cajner, I. Žmak  
(2021). *Osnove modeliranja i simulacija*, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje



## Additional Literature



Šošić, I. (2004). *Primijenjena statistika*, Školska knjiga



Čerić, V. (1993). *Simulacijsko modeliranje*, Školska knjiga

## Similar Courses

» -, Oxford

# Computer Simulations and Modelling D

188532



## Lecturer



prof. dr. sc.  
Goran Đukić

|                      |     |
|----------------------|-----|
| ECTS Credits         | 6.0 |
| English Level        | Lo  |
| E-learning Level     | L1  |
| Study Hours          |     |
| Lectures             | 30  |
| Laboratory exercises | 45  |

## Associate Lecturers

Hrvoje Cajner  
Miro Čolić  
Darko Landek

## Teaching Assistants

Tihomir Opetuk  
Ivan Putnik

## Grading

Obligatory attendance of lectures and exercises. 2 midterms or written final exam. Active participation in teaching (work with computer systems VBS and JCATS) is evaluated, two midterms or written exams and final oral exams are held. The average grade from both passed exams is equivalent to a written part of the exam. Students who fail to attend the midterm will approach the written exam. The final grade of the exam is determined by two grades or written exams (70%), the grade of active participation in the classroom (VBS and JCATS) (10%) and the final oral exam (20%).

## Course Description

Acquisition of knowledge on different modeling and simulation methods, development of simulation models and their application in realistic military, technical and organizational systems. Multidisciplinary approach to modeling and simulations. Dissemination of acquired knowledge by applying different simulation tools. Theory and practice of application of commercial computer tools to build simulation models. Basics of application of expert systems and systems of artificial intelligence based on data mining and machine learning.

## Study Programmes

» Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Explain the structure and operation of the technical and organizational system (military and civil).
2. Formulate a mathematical or experimental model of production, logistics and organizational systems.
3. Suggest appropriate methods for predicting the characteristics of technical and organizational systems.
4. Apply simulation in solving problems in manufacturing, logistics and organizational systems.
5. Evaluate the chosen modeling method and simulation results in relation to the behavior and properties of the real system.
6. Explain the application of the artificial intelligence method.
7. Choose and apply suitable scenario of events on the battlefield.
8. Evaluate and critically analyze the results of the battlefield simulation.

## Study Programme Learning Outcomes

### Screening of student's work

|                              |
|------------------------------|
| 2.5 ECTS Lectures attendance |
| 3 ECTS Midterm exam          |
| 0.5 ECTS Oral exam           |
| <hr/> 6 ECTS                 |

## Forms of Teaching

- » Lectures
  - » Classical ex cathedra lecture.
- » Exercises
  - » PC Lab exercises.

## Week by Week Schedule

1. Introduction to systems theory, modeling and simulation.  
Definitions and basic elements of technical and organizational systems and processes (military and civil).
2. Tasks and Modeling Objectives. Experimental and theoretical models.  
Preparation and development of the model.
3. Computer simulations based on analytical and numerical models.  
Verification of computer simulations.
4. Introduction to Game Theory.  
Basic elements, types and strategies of the game.
5. Statistical analysis of the process.  
Statistical modeling and regression analysis.
6. Modeling using experiment planning method.
7. Mid term 1
8. Discrete Events Simulation (DES).  
Enterprise Dynamics10 (ED10) and DES objects.  
Connecting DES objects, defining attributes, and managing events.
9. Methodology of DES modelling, examples.  
Trends in DES.
10. Simulations in military education and training.
11. The concept and capabilities of the VBS computer system.  
Operator training.
12. JCATS Concept and Capabilities.  
The role of the doctors in the exercise of the exercise.  
The role of the operator and staff of the units in exercising the exercises.
13. The basics of intelligent systems.  
Expert systems based on rules.  
Fuzzy expert systems.
14. Artificial Neural Networks.  
Basics of genetic algorithms and genetic programming.  
The basics of machine learning and data mining.
15. Mid term 2

## Literature



D. Landek, H. Cajner, I. Žmak (2021). *Osnove modeliranja i simulacija*, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje



D. Landek, H. Cajner, G. Đukić, D. Lisjak (2021). *Interni nastavni materijali dostupni na sustavu za e-učenje*

## Similar Courses

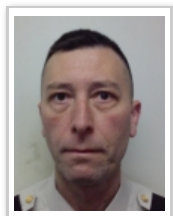
- » -, Oxford

# Contemporary CBRN Threats and Toxicological Consequences

188539



## Lecturer



doc. dr. sc.  
Ante Vučemilović

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | L2  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Seminar          | 15  |

Associate Lecturer  
Valentina Ključarić

## Grading

10% of the final grade makes participation in teaching and the preparation of seminar papers 70% in the final grade make partial exams (questioning) 20% of the final grade makes the knowledge shown on the final oral exam

## Course Description

Participants are given specific scientific-based data in the field of science and technology that may be the relevant technical and technological basis for the spectrum of KBRN threats and threats. Explain the importance of the presence of radiological, chemical and biological origin in modern wars and their consequences.

## Study Programmes

» Military Leadership and Management (Study) (*elective courses, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Apply knowledge and discuss the toxicological consequences of KBRN threats.
2. Analyze and interpret technical and technological opportunities in warfare and terrorism through KBRN funds.
3. Apply knowledge of advanced technologies in the KBRN area
4. Explain and interpret concepts and international conventions that include unconventional warfare and terrorism through KBRN tools through the analysis of contemporary KBRN threats and threats

## Study Programme Learning Outcomes

### Screening of student's work

|                              |
|------------------------------|
| 0.5 ECTS Lectures attendance |
| 2 ECTS Midterm exam          |
| 0 ECTS Written exam          |
| 0.5 ECTS Seminar report      |
| <hr/> 3 ECTS                 |

## Forms of Teaching

- » Lectures
  - » Lectures
- » Seminars and workshops
  - » Seminar work

## Week by Week Schedule

1. Contemporary KBRN Threats, (Introductory lesson): Introducing the subject content, the lecturers, getting acquainted with the dynamics and content of the lectures, the terms and obligations of the attendees and the evaluation and evaluation system. KBRN threats and threats and wider context of mass destruction.
2. International conventions and documents.
3. Military chemical threats.
4. Military radiological and nuclear threats.
5. Military biological threats.
6. Terrorist chemical threats.
7. Terrorist radiological and nuclear threat.
8. Terroristic biological threats.
9. Electromagnetic weapons (range of the electromagnetic spectrum, methods, means, purpose and effects on the living force) 2 hours
10. Preventive measures in defense of KBRN threats and threats (planning, education, equipment and technology, methodology, system interconnection, biosecurity and bioprotection measures).
11. Active and repressive measures.
12. The toxicological effects of KBR noxious on the body.
13. Long-term and delayed effects of KBRN on the body (problems in detection, diagnosis and treatment).
14. Advanced technologies in the field of CBRN noxi (integrated synthetic-biological systems, GMO technologies, synthetic biology-artificial intelligence, electromagnetic radiation) 4 hours
15. Partial exam 2

## Literature



Vučemilović, A (2019).  
*Oružja za masovno uništavanje: Kemijsko i biološko oružje*, MORH, Sveučilište u Zagrebu



Shemer, J; Shoenfeld Y (2007). *Terorizam i medicina*, Medicinska naklada



Vučemilović, A (2010).  
*Toksikološke posljedice oružja za masovno uništavanje i noksi u suvremenom ratovanju i terorizmu*, Archives of Industrial Hygiene and Toxicology, 2010; 61:247-256

## Similar Courses

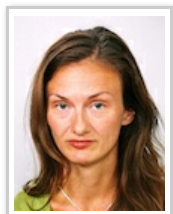
» , West Point

# Contemporary Methods of Analysis and Establishing Chemical Compound Structure

188518



## Lecturer



prof. dr. sc.  
Dragana Mutavdžić  
Pavlović

## Course Description

The aim of this course is to familiarize students with contemporary methods of real samples analysis and their basics and to provide them with the necessary knowledge to independently select a suitable analytical method, perform it, interpret the results of the analysis and understand the meaning of the information obtained. Students will be able to apply spectroscopic methods of ultraviolet and visible spectroscopy (UV / VID), infrared spectroscopy (IR), fluorescence spectroscopy, single- and two-dimensional nuclear magnetic resonance (1D and 2D  $^1\text{H}$  and  $^{13}\text{C}$  NMR) and mass spectrometry in determining the structure of organic compounds.

## Study Programmes

- » Military Engineering (Study) (*elective group of compulsory subjects, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Apply the acquired knowledge during the course and apply them in decision making and problem solving in the analysis of real samples
2. Argue the advantages, disadvantages and limitations of each sample preparation method
3. Apply sampling methods to real samples and prepare the real samples for analysis, analyze them, interpret and evaluate the obtained analysis results
4. Analyze and interpret spectra of known organic compounds by spectroscopic methods UV / VID, FTIR, fluorescence,  $^1\text{H}$  and  $^{13}\text{C}$  NMR, and mass spectrometry
5. Analyze, determine and confirm the structures of unknown compounds based on data obtained by spectroscopic methods
6. Explain the factors affecting spectral parameters in UV / VIS, FTIR,  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra

## Study Programme Learning Outcomes

|                      |         |
|----------------------|---------|
| ECTS Credits         | 6.0     |
| English Level        | L3      |
| E-learning Level     | L1 (5%) |
| Study Hours          |         |
| Lectures             | 30      |
| Seminar              | 15      |
| Laboratory exercises | 30      |

### Associate Lecturers

Danijela Ašperger  
Marijana Hranjec  
Svjetlana Krištafor

### Teaching Assistants

Ivana Cetina  
Tatjana Gazivoda Kraljević  
Valentina Ključarić

### Grading

Out of a total of 100 points that a student can gather by attending lectures and seminars, by doing laboratory exercises, by completing a seminar, by placing two partial tests and/or final exams and final oral exam for the passage, is 60 points. Arrival at lectures and seminars is mandatory and brings up to 5 points. In order for a student to get one of the exam requirements, it is necessary to be in almost all lectures and seminars or to collect at least 4 points. Laboratory exercises can earn up to 15 points, with laboratory reports, practical work, and results of colloquia/test. For a successful completion of the laboratory exercise, it is necessary to achieve at least 6 points. By creating and presenting an independent seminar work (search for literature on a given topic, writing a work and exposing 5 to 10 minutes) it is possible to achieve a maximum of 5 points. Seminar work is not mandatory. During the semester, two partial

## Screening of student's work

|                            |
|----------------------------|
| 1 ECTS Lectures attendance |
| 0.5 ECTS Experimental work |
| 2 ECTS Midterm exam        |
| 0 ECTS Written exam        |
| 0.5 ECTS Research          |
| 0.5 ECTS Report            |
| 0.5 ECTS Seminar report    |
| 1 ECTS Oral exam           |
| <hr/> 6 ECTS               |

tests are written with theoretical and computational tasks. Partial tests are not mandatory but allow exemption from taking the exam and direct access to the final exam. Partial tests carry up to 75 points. The final oral exam is mandatory and it is possible to achieve 20 points. Rating: 60-69 points (sufficient); 70-79 points (good); 80-89 (very good) and 90-100 points (excellent).

## Forms of Teaching

- » Lectures
  - » PowerPoint presentations
- » Seminars and workshops
  - » Solving practical problems like interpretation of the obtained spectra (UV / VIS, IR, NMR, MS spectra)
- » Field work
  - » visit to the Croatian Standards Institute
- » Independent assignments
  - » making and presenting seminar work on a given topic
- » Laboratory
  - » practical exercises in the lab

## Week by Week Schedule

1. Definition of the sample. Sampling errors and sampling uncertainty. Sampling planning. Sampling procedures (air, water, soil, sediment, biological samples).

Laboratory exercises: Preparation of water samples for chromatographic analysis: Determination of the usefulness of the solid phase preparation column (SPE) using liquid chromatography of high performance.

2. Preparation of samples for analysis. Importance and the basic principle of sample preparation in the analysis. The objective of sample preparation. Optimization of the sample preparation process.

Laboratory exercises: Preparation of water samples for chromatographic analysis: Determination of the usefulness of the solid phase preparation column (SPE) using liquid chromatography of high performance. Comparison of extraction methods for the determination of polyphenolic compounds in food samples: extraction by scattering the sample nut through a solid phase, solvent extraction by ultrasound and microwaves.

3. Review the method of sample preparation. Extraction as the oldest sample preparation method. Analytes in solid samples. Analytes in liquid samples. Analytes in the Gaseous Phase. Other methods of sample preparation. Real Samples: Problems and Access. Special applications.

Laboratory exercises: Comparison of extraction methods for the determination of polyphenolic compounds in food samples: extraction by scattering the sample nut through a solid phase, solvent extraction by ultrasound and microwaves.

4. Techniques and methods of chemical analysis according to the type of samples: analysis of inorganic and organic compounds. Classical methods. Instrumental methods (spectrometry, electroanalytic methods, separation and other techniques). Qualitative analysis (identification and detection) and quantitative analysis.

Laboratory exercise: Comparison of HPLC and HPTLC analytical methods: HPLC-DAD determination of sulfonamide antibiotics in wastewater - identification and detection.

5. Standard methods in environmental analytics. Calibration procedures. Macroanalysis of compounds. Trace analysis and ultratrace analysis.

Laboratory exercise: Determination of inorganic compounds in inorganic matrix using classical and instrumental methods. Determine a rough error (Q-test).

6. Insurance of measurement data quality: errors in environmental analysis, validation of methods, uncertainty measurement, chemometrics in analytics.

Laboratory exercise: Validation of chromatographic determination of pesticides in soil.

7. First partial test

8. Ultraviolet-visible spectroscopy (UV/VIS): electronic transitions, basic photophysical processes, light absorption (Lambert-Beer's law), chromophores, examples of UV/VIS spectra. Fluorescence spectroscopy, examples of emission spectra.

Practice problems: Recording and interpretation of qualitative and quantitative absorption and emission spectra of selected molecules.

9. Infrared spectroscopy with I Transformation (FTIR): vibration of covalent bonds in molecules (stretching and bending), area of functional groups and fingerprint area, examples of IR spectra.

Practice problems: Recording and interpretation of IR spectra of selected molecules

10. Nuclear magnetic resonance spectroscopy ( $^1\text{H}$  i  $^{13}\text{C}$  NMR): physical principles, spectral parameters of NMR (chemical shift, spin-spin coupling constant J, relative signal intensity, peak width), factors influencing chemical shift, Nuclear Overhauser effect (NOE)

Practice problems: Interpretation of  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of selected molecules and confirmation of their structure.

11.  $^1\text{H}$  NMR spectroscopy: spin-spin couplings ( $^1\text{H}$ - $^1\text{H}$ ), multiplets (n+1 rule), coupling schemes

Practice problems: spin-spin coupling and multiplet interpretations in  $^1\text{H}$  NMR spectra

12.  $^{13}\text{C}$  NMR spectroscopy: spin cutting techniques; untreated and rasped spectra, APT, DEPT  
Two-dimensional (2D) NMR spectroscopy: homonuclear  $^1\text{H}$ - $^1\text{H}$  (COSY, NOESY) and heteronuclear  $^1\text{H}$ - $^{13}\text{C}$  (HSQC, HMQC) correlations

Practice problems:  $^{13}\text{C}$  NMR spectra interpretation; application of 2D NMR spectroscopy in molecular structure confirmation

13. Mass spectrometry (MS): ionization methods, high resolution mass spectrometers, basic processes of fragmentation of organic compounds.

Practice problems: Recording and interpretation of MS spectra of selected molecules.

14. Presentation of seminar papers by students

15. Second partial test



## Literature



skupina autora (ur. M. Kaštelan-Macan, M. Petrović) (2013). *Analitika okoliša*, HINUS i Fakultet kemijskog inženjarstva i tehnologije (FKIT) Sveučilišta u Zagrebu

## Similar Courses

» -, Oxford

# Contemporary Military Concepts

188529



## Lecturers



izv. prof. dr. sc.  
Robert Mikac



doc. dr. sc.  
Andrija Kozina

|                  |         |
|------------------|---------|
| ECTS Credits     | 6.0     |
| English Level    | L1      |
| E-learning Level | L1 (5%) |
| Study Hours      |         |
| Lectures         | 45      |
| Exercises        | 30      |

Associate Lecturer  
Suzana Filjak

## Grading

Students must regularly attend classes, to take active part in discussions and in on-line forum, as well as in exercises. Each student (individually or in a group) is obliged to carry out one literature research on a given topic and produce a review paper/report and present the main conclusions to other students, according to a pre-planned schedule and actively contribute to discussion after each presentation. Prior to end of the course, each student has to write an short essay with argumentative thesis defense. Positively evaluated essay is pre-requirement for written exam. A student takes the final oral exam after all obligations he/she carried out (passed both mid-term exams and positive evaluation of written exam, with previously written and positively evaluated essay). Students have the opportunity to take two written exams (midterm and final exam) and if both are positive, the student is exempt from the final written exam at the end of the course.

## Course Description

The study and analyses of military concepts in contemporary security environment. The emphasis is placed on understanding the nature and characteristics of conditions contemporary military operations are implemented in, on recognizing threat indicators and potential of the military element of national power in prevention and response to security threats.

The aim of the subject is to develop or rather build within a student the capability of adjustment to changes of the contemporary military environment and awareness of the situation. Likewise, to actively participate in the process of understanding and creation of the military concepts, as a response to contemporary security threats.

## Study Programmes

- » Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Differentiate and compare the existing security threats (military and non-military) at national, regional and global scene;
2. Predict the outcomes and the effects of the possible impact of certain security threats on key national infrastructures;
3. Differentiate and compare capabilities and spectrum of military operations and evaluate and formulate their importance in the contemporary security environment;
4. Relate the differences and specifics of unconventional versus conventional warfare;
5. Analyze the concept of information operations and compare their capabilities and functions and to evaluate effects of their activities;
6. Evaluate, estimate and analyse the methods and outcomes of new warfare paradigms, with emphasis on hybrid and asymmetric warfare;
7. Compare, review and rethink historical military concepts and the operational environment in which they were created and applied;
8. Relate and associate different military concepts and create new responses to prevent potential security threats and illustrate military response capabilities in different operational environments;
9. Analyze and propose options for the development of military capabilities (especially "small states") with a view to maintaining security and preventing conflicts, as well as valid responses to contemporary security threats;

## Study Programme Learning Outcomes

## Screening of student's work

- 0.2 ECTS Lectures attendance
- 0.5 ECTS Essay
- 1.8 ECTS Midterm exam
- 0.5 ECTS Research
  - 1 ECTS Seminar report
- 0.5 ECTS Forum - on line
- 0.5 ECTS Case study and participation in classroom discussions
  - 1 ECTS Presentation of research studies
- 6 ECTS

## Forms of Teaching

- » Lectures
  - » 3 hours per week (usually a one topic/lesson); total of 45 school hours
- » Exercises
  - » 2 school hours per week - the content of the exercise follows the lesson/topic of the lecture; a total of 30 hours
- » Partial e-learning
  - » Forum - discussion on the default topic (2 times, about 1 school hour before each exam).  
Education materials and literature (mandatory and recommended) for students self-study assignments available on the e-learning system; e-mail communication available.
- » Independent assignments
  - » Research paper and presentation of research paper on a given / selected topic - individually or in a group (up to 3 students);  
Essay - defense of the selected thesis;  
Case studies (group work and discussion)

## Week by Week Schedule

1. Introduction to the Course (overview of topics, schedule, tasks for students, topics for research studies, deadlines, evaluation criteria)
  - L-1: Characteristics of contemporary military operations,
  - E-1: Threat Indicators
2. L-2: Military concepts through the history of warfare,
  - E-2: Development of Military Concepts - Case study
3. L-3: New Paradigms of Warfare - Hybrid Forms,
  - E-3: Analyses of the Operational Environment
4. L-4: Insurrections and Counterinsurgency Operations
  - E-4: Counterinsurgency Operations (COIN) - Case study
5. L-5: Terrorism and anti-terrorist activities
  - E-5: Anti-terrorist Activities - Case study
6. E-6: Urban operations
  - L-6: Urban Operations - Case study
7. Mid-Term Exam
8. L-7: Information operations,
  - E-7: Assessment of Information Operations Effects
9. L-9: Psychological operations
  - E-9: Psychological Operations - studija slučaja
10. L-10: Military deception
  - E-10: Military Deception - Case study
11. L-10: Cybernetic (cyber) Operation
  - T-11: Electronic Warfare

12. L-12: Civil-military cooperation  
E-12: Civil-military Cooperation (CIMIC) - Case study
13. L-13: Reform of the security system  
E-13: Armed Forces Transformation
14. L-14: Military Creations  
E-14: Military Critical and Creative Thinking
15. Exam  
Final Written Exam

Exam period

## Literature



Slavko Barić i Robert Barić (2018). *Asimetrično ratovanje i transformacija vojne organizacije (odabrana poglavlja)*, Ministarstvo obrane Republike Hrvatske, Oružane snage Republike Hrvatske, Hrvatsko vojno učilište „Dr. Franjo Tuđman”



John F. Schmitt (2002). *A Practical Guide for Developing and Writing Military Concepts*, Hicks & Associates, Inc.



Robert Mikac (2013). *Suvremena sigurnost i privatne sigurnosne kompanije: privatizacija sigurnosti i posljedice (odabrana poglavlja)*, Naklada Jesenski i Turk



David Eugene Johnson (2014). *Military Capabilities for Hybrid War*, Rand Corporation



Glavni stožer OS RH (2016). *Doktrina Oružanih snaga RH - ZDP 1 (A) (odabrani dijelovi)*, Ministarstvo obrane Republike Hrvatske, Oružane snage Republike Hrvatske, Glavni stožer OS RH



Željka Pavić-Glivetić (2018). *Informacijske operacije (odabrana poglavlja)*, Ministarstvo obrane Republike Hrvatske, Oružane snage Republike Hrvatske, Glavni stožer OS RH



Jugoslav Jozić, Slavko Barić, Robert Barić (2016). *Hybrid Warfare - Cases of Croatia and Ukraine (CZECH MILITARY REVIEW)*, University of Defence, Czech Republic,



Želimir Pavlina, Zoran Komar (urednici) (2005). *Vojna psihologija - Priručnik za hrvatske časnike, knjiga treća (poglavlja 48., 49. i 50.)*, Ministarstvo obrane Republike Hrvatske

## Additional Literature



Gregory Fremont-Barnes (2019). *A History of Modern Urban Operations (selected chapter)*, Springer Nature



Asymmetric Warfare Group (2016). *Modern Urban Operations: Lessons Learned from Urban Operations from 1980 to the Present*, US Army



(2015). *AJP-3.10., Allied Joint Doctrine for Information Operation (selected chapters)*, NATO



(2014). *AJP-3.10., Allied Joint Doctrine for Psychological Operation (selected chapters)*, NATO



(2016). *AJP -3.4.4., Allied Doctrine for Counter-Insurgency (COIN)*, (selected chapters), NATO



Slavko Barić, Robert Barić (2011). *Asimetrično ratovanje i vojne doktrine (odabrana poglavlja)*, Veleučilište Velika Gorica



Harald Hoiback (2013). *Understanding Military Doctrine (selected chapters)*, Routledge

## Similar Courses

» Nema, Oxford

# Crisis Management

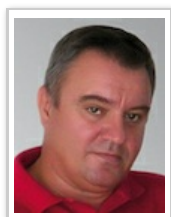
188531



## Lecturers



izv. prof. dr. sc.  
Robert Mikac



prof. dr. sc.  
Željko Dobrović

|                  |          |
|------------------|----------|
| ECTS Credits     | 3.0      |
| English Level    | Lo       |
| E-learning Level | L1 (15%) |
| Study Hours      |          |
| Lectures         | 30       |
| Exercises        | 15       |

Associate Lecturer  
Miro Čolić

## Grading

Attendance at lectures and exercises is mandatory. Taking 2 colloquia or written exam and final oral exam. Active participation in exercise and teaching is valued. The average grade from both passed colloquia is equivalent to the grade of the written part of the exam. Students who do not pass the colloquia take a written exam. The final grade of the exam was determined by the grade of two colloquia or written exam (70%), the grade of active participation in exercises and classes (10%) and the grade of the final oral exam (20%).

## Course Description

Through the systematization of existing and the acquisition of new knowledge about crises to understand and be able to analyze the basic concepts and principles of crisis management, the place and role of state institutions and armed forces in crises, natural and technical disasters in Croatia and abroad. Be able to explain the components, links and basic concepts applied in the cycle: threat assessment - development of crisis management plans - implementation of the defense planning process in the Republic of Croatia and NATO.

## Study Programmes

» Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Assess the effectiveness and need for pooling forces within tactical level operations
2. Explain the basic processes and organization of crisis management in the Republic of Croatia, NATO, EU and UN and some countries
3. Assess the roles, responsibilities and linkages of the fundamental elements of national power and the use of the military element of power in crises
4. Analyze the use of military capabilities in response to crises at the national level and in the international environment
5. Explain the basic components of the process: threat assessment - development of plans - the process of defense planning in the Republic of Croatia and NATO
6. Plan and implement the use of a platoon-level military unit in crisis response operations in the Republic of Croatia and abroad

## Study Programme Learning Outcomes

### Screening of student's work

|                               |
|-------------------------------|
| 0.25 ECTS Lectures attendance |
| 2 ECTS Midterm exam           |
| 0.75 ECTS Practical work      |
| <hr/> 3 ECTS                  |

## Forms of Teaching

- » Lectures
  - » Lectures using standard presentation methods - Power point
- » Exercises
  - » Implementation of the exercise of planning and use of military unit level platoon in crisis response operations in the Republic of Croatia and abroad
- » Partial e-learning
  - » As part of the teaching process, up to 20% of courses will be conducted with the help of the e-learning system - MERLIN

## Week by Week Schedule

1. Introduction to the subject, contemporary and traditional threats, crises - conceptual definition of crisis, terminology
2. Crisis management process and activities, principles of crisis management
3. Strategy - "Ends - Ways - Means", Boyd "OODA" loop
4. Crisis management measures, elements of power, areas of action - a comprehensive approach (PMESII)
5. Components of the crisis management system in the Republic of Croatia, threat and risk assessment for the Republic of Croatia
6. Methodology of drafting the defense plan of the Republic of Croatia, basics of defense planning in the Republic of Croatia
7. Colloquium
8. Crisis management in foreign countries
9. IO and NGOs in crises
10. Crisis management - NATO
11. Crisis management - EU
12. Crisis Management - UN
13. Crisis management and military capabilities
14. Components of the process: threat assessment - development of plans - the process of defense planning in the Republic of Croatia and NATO
15. Colloquium

## Literature



(2005). *AJP-3.4, Allied Joint Doctrine for Non-Article 5 Crisis Response Operations*, NATO, 2005, NATO



(2006). *AJP 3.4.1 Operacije potpore miru, Zagreb*, MORH

## Similar Courses

- » Crisis Management, Stanford University

# Diploma thesis

188528

## Course Description

Creating a master's thesis is a comprehensive task in which the student, through independent work, demonstrates the ability to analyze a given problem from both theoretical and practical perspectives. With the guidance of mentors, the student develops the thesis, presenting a solution to the assigned problem by applying knowledge acquired from the subjects taken during the master's program and utilizing relevant literature as needed. In the end, the student presents the thesis in written and oral forms. The emphasis is on proving competence in all the mentioned aspects, rather than solely on successfully completing routine tasks. The student is assigned two mentors: the first is a university lecturer from the component that is the thesis supervisor, and the second is from the ranks of officers or military experts of the Armed Forces of the Republic of Croatia. The mentors propose the topic of the master's thesis, which is related to the student's chosen specialization throughout their entire academic program.

## Study Programmes

- » Military Engineering (Study) (*required course, 2nd semester, 1st year*)
- » Military Leadership and Management (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. To connect the knowledge and skills acquired during studies and develop the ability for additional learning from mandatory or supplementary literature with mentor guidance.
2. To choose, argue for, and justify the proposed solution.
3. To model, simulate, or create a prototype for a given task with defined functionalities.
4. To formulate and write the final thesis and draw conclusions in a linguistically and ethically correct manner, in accordance with instructions, with an average length of 30 printed pages.
5. To publicly present the obtained results using a computer-prepared presentation with a ten-minute oral presentation.

## Study Programme Learning Outcomes

### Screening of student's work

- o ECTS Experimental work
- o ECTS Research
- o ECTS Oral exam
- o ECTS Project
- o ECTS Practical work
- o ECTS

## Forms of Teaching

- » Exercises
  - » Creating a master's thesis.
- » Independent assignments
- » Laboratory
- » Work with mentor

|                  |      |
|------------------|------|
| ECTS Credits     | 15.0 |
| English Level    | L3   |
| E-learning Level | L1   |
| Study Hours      |      |
| Field exercises  | 225  |

### Grading

Assessment: A student whose master's thesis is positively evaluated by the mentor defends their thesis before the Commission for the Defense of the Master's Thesis.



## Week by Week Schedule

1. Creating a master's thesis.
2. Creating a master's thesis.
3. Creating a master's thesis.
4. Creating a master's thesis.
5. Creating a master's thesis.
6. Creating a master's thesis.
7. Creating a master's thesis.
8. Creating a master's thesis.
9. Creating a master's thesis.
10. Creating a master's thesis.
11. Creating a master's thesis.
12. Creating a master's thesis.
13. Creating a master's thesis.
14. Creating a master's thesis.
15. Creating a master's thesis.

## Literature



- *Prema uputama mentora*, -

## Similar Courses

» -, Oxford

# Fundamentals of Branch and Service Employment

188522

## Lecturers



doc. dr. sc.  
Mladen Viher



prof. dr. sc.  
Neven Vrčec

## Course Description

Acquiring knowledge about the basic characteristics of combat branches, combat support branches and services of the Armed Forces. Point out the importance of their integration (combination) in the entire spectrum of tactical level operations.

## Study Programmes

- » Military Engineering (Study) (*required course, 2nd semester, 1st year*)
- » Military Leadership and Management (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Recognize the mutual integration of combat branches and combat support branches.
2. Identify and analyze more complex problems in the military environment.
3. Explain the role of each branch/service in the entire spectrum of tactical level operations.
4. Assess the effectiveness and need for joint forces within tactical level operations.
5. Recognize the combat and non-combat assets of the branches and services of the Armed Forces of the Republic of Croatia.
6. Produce the results of complex work in oral and written form to stakeholders in a military environment in a clear and comprehensible manner.

## Study Programme Learning Outcomes

### Screening of student's work

- 1 ECTS Lectures attendance
- 2 ECTS Midterm exam
- 1 ECTS e-learning regularity
- 4 ECTS

## Forms of Teaching

- » Lectures
  - » Obligatory presence.
- » Exercises
  - » Discussion of doctrinal documents and analysis of war games.

|                  |             |
|------------------|-------------|
| ECTS Credits     | 4.0         |
| English Level    | Lo          |
| E-learning Level | L1<br>(10%) |
| Study Hours      |             |
| Lectures         | 30          |
| Exercises        | 30          |

## Associate Lecturers

Dalibor Gernhardt  
Vladimir Horvat  
Valnea Kerbavčić Degač  
Mario Klun  
Bernarda Krulić Mutavčić  
Leonardo Lorusso  
Marijan Paljević

## Grading

Participants must be present for at least 80% of classes, which carries 25 out of 100 points of the total grade for the course. Exams are written in the middle and at the end of the semester to check the acquired formal knowledge of the topics covered in that period, the exams must be solved with more than 50% to pass, and each quizzes carries 25 out of 100 points in the total grade. With e-learning, acquired knowledge is refreshed on a weekly basis, in the period between two lectures, shorter topics are given for reflection and connection with current events. e-learning encourages self-reflection and expression of opinions, participants must participate in at least 80% of e-learning and this earns them 25 out of a total of 100 points for the final grade. The final grade depends on the number of points obtained: <50 insufficient, 70 > points >= 50 sufficient, 79 > points >= 70 good, 88 > points >= 79 very good and 88 >= excellent points. An oral exam is possible at the request of the participant.

- » Partial e-learning
  - » Minor independent work between lectures and preparation for the next lecture via e-learning.
- » Multimedia and the internet
  - » Monitoring of current affairs from the development of military doctrines and technologies.
- » Other
  - » Additional topics according to the special interest of the participants.

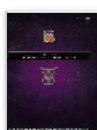
## Week by Week Schedule

1. Lectures: Introduction to the subject. History of the development of branches and services of the Armed Forces. Branches and services of the Armed Forces of the Republic of Croatia.  
Exercises: Analysis of the current organization of the Armed Forces of the Republic of Croatia.
2. Lectures: Doctrine of the Armed Forces of the Republic of Croatia. Planning operations in the Armed Forces of the Republic of Croatia.  
Exercises: Analysis of the document ZDP-1 Doctrine of the Armed Forces of the Republic of Croatia. Analysis of document ZDP-5 Planning of operations.
3. Lecture: Joint operations of the Armed Forces of the Republic of Croatia. Allied Joint Doctrine.  
Exercises: Analysis of document ZDP-30 Combined operations. Analysis of document AJP-01 Allied Joint Doctrine.
4. Lecture: Doctrine of land forces.  
Exercises: Analysis of document DPK-01 Doctrine of land forces.
5. Lecture: Doctrine of land forces.  
1st colloquium.
6. Lecture: Critical path analysis (CPA) in military operations. War games.  
Exercises: Creation of network diagrams, critical path and optimization.  
Practical implementation of the war game.
7. Lecture: War games.  
Exercises: Practical implementation of the war game.
8. Lectures: GEOMETOC (Geographic-Meteorological-Oceanographic) support for military operations.  
Exercises: Practical implementation of the war game. Developing GEOMETOC tools for tactical decision-making.
9. Lectures: GEOMETOC (Geographic-Meteorological-Oceanographic) support for military operations. Mission command.  
Exercises: Developing GEOMETOC tools for tactical decision-making. An analysis of the ADP 6-0 Mission Command document.
10. Lectures: Military futurology and future development of OS doctrines.  
2nd colloquium.
11. -
12. -
13. -
14. -
15. -

## Literature



(2024). *Lekcije predmetnih nastavnika*



(2016). *ZDP-1(A) Doktrina Oružanih snaga Republike Hrvatske*, MORH i GS OS RH



(2020). *DPK-01 Doktrina kopnenih snaga*, MORH, HKoV



(2017). *ZDP-30 Združene operacije*, GS OS RH



(2019). *ZDP-5 Planiranje operacija*, GS OS RH

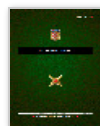


(2022). *AJP-01 Allied Joint Doctrine*, NATO Standardization Office



(2019). *ADP-6-o Mission Command*, US Army HQ

## Additional Literature



(2015). *DPK-200-P Operativni pojmovi*, MORH, HKoV



(2022). *ZDP-P Rječnik pojmova i definicija*, GS OS RH



Pahernik M., Popović D., Kosanović K., Klun M., Viher M., Mandić I., Petrović D., Čaleta-Car B., Horvat V., Vučemilović A., Kovač L. i Damiani I. (2019). *Temelji uporabe rodova i službi*



Aaron P. Jackson (2013). *The Roots of Military Doctrine - Change and Continuity in Understanding the Practice of Warfare*, US Army Combined Arms Center, Fort Leavenworth



Balboni M., Bonin J., Orsi D., Bondra C., Dunmyer A., Marks L. i Miller D. (2020). *Mission Command of Multi-Domain Operations*, US Army War College, Strategic Studies Institute



Robert J. Bunker (2020). *Mission Command and Armed Robotic Systems Command and Control*, Association of the United States Army



(2020). *Simboli nadzornih mjera*, GS OS RH



(2023). *The Military Balance 2023*, The International Institute for Strategic Studies

## Similar Courses

» MS200 - FUNDAMENTALS: ARMY OPERATIONS, West Point

# Fundamentals of Strategy

188519



## Lecturers



Gordan Akrap,  
dr. sc.



doc. dr. sc.  
Davor Ćutić

ECTS Credits 3.0

English Level Lo

E-learning Level L2  
(10%)

Study Hours

Lectures 30

Seminar 15

Associate Lecturer

Slaven Zdilar

Teaching Assistants

Marijan Paljević

Andrija Platužić

Grading

Regular monitoring and evaluation of the student's work during class, and final testing at the final written and/or oral exam. 1. Class and seminar attendance (active class and seminar attendance is evaluated). Students are expected to take part in discussion in class/seminar, related to analysed texts and students' presentations. 2. Essay on previously agreed topic; seminar presentation of the analysed topic, in duration of 15 minutes max.

## Course Description

Students should gain knowledge about the theory and practice of strategy. Strategy implies the concept of grand strategy, or rather combining political, economic, military and other means, in efforts to realize national goals and interests of the states. In this process, emphasis will be placed on military component of the grand strategy.

## Study Programmes

- » Military Engineering (Study) (*required course, 1st semester, 1st year*)
- » Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Explain of the complexity of developing, implementation and consequences of the grand strategy
2. Develop capability of analysing the impact of international and national politics in shaping of the strategy
3. Explain the historical development of the strategy from Antiquity to the present time
4. Distinguish the relationship among grand strategy, military strategy and defence planning.
5. Differentiate and connect of the strategic, operational and tactical level of strategy implementation
6. Analyze strategic challenges in the early 21st century

## Study Programme Learning Outcomes

### Screening of student's work

0.5 ECTS Lectures attendance

1 ECTS Essay

1 ECTS Oral exam

0.5 ECTS Other activities 1 (describe)

3 ECTS

## Forms of Teaching

### » Lectures

» Each thematic block will be supported by an appropriate case study (selection of a particular strategy, analysis of its possible alternatives; factors that affected strategy shaping; political and military consequences of its use), supported by students' analysis, and presentation of seminar papers.

### » Seminars and workshops

» Each thematic block will be supported by an appropriate case study (selection of a particular strategy, analysis of its possible alternatives; factors that affected strategy shaping; political and military consequences of its use), supported by students' analysis, and presentation of seminar papers.

### » Partial e-learning

» Forum discussions.

### » Independent assignments

» Independent assignment comprises writing and presentation of the seminar paper.

## Week by Week Schedule

1. Defining strategy (Introduction to grand strategy, components of strategy, and the use of various instruments of power for realization of strategic goals).
2. Strategic culture.
3. Immaterial factors and strategy (Western and Eastern mode of warfare).
4. Grand strategy and military strategy (Relation of strategy and warfare, impact on development of military doctrine and defence planning).
5. War and strategy (Total war, restricted war, strategy as a threat to use force).
6. Historical development of strategy – ancient times and the Middle Ages (Sun Tzu, Tukidid).
7. Historical development of strategy – early modern period (Machiavelli)
8. Foundations of the modern strategic theory (Clausewitz, Jomini, Hart)
9. Strategy development in the 20th century – land warfare
10. Strategy development in the 20th century – maritime warfare.
11. Strategy development in the 20th century – air warfare, space.
12. Strategy development in the 20th century – nuclear warfare.
13. Strategy development in the 20th century – irregular warfare (Strategy of the revolutionary war, hybrid warfare).
14. Grand strategies in the early 21st century.
15. The future of strategy.

## Literature



Murray W. et al (1994). *The Making of Strategy: Rulers, States and War*, Cambridge University Press



Heuser, Beatrice (2010). *The Evolution of Strategy: Thinking War from Antiquity to Present*, Cambridge University Press



Gray, Colin S (2010). *Strategy Bridge: Theory for Practice*, Cambridge University Press

## Additional Literature



Elinor, Solan C (2012). *Modern Military Strategy: An Introduction*, Routledge



Freedman, Lawrence (2013). *Strategy: A History*, Oxford University Press



Parret, Peter (ur.) (1986). *Makers of Modern Strategy: from Macchiavelli to the Nuclear Age*, Princeton University Press



Gray, Collin (2014). *Strategy and Defence Planning: Meeting the challenge of uncertainty*, Oxford University Press



Milewski, Lukas (2016). *The Evolution of Modern Grand Strategic Thought*, Oxford University Press

## Similar Courses

» -, Oxford

# Homeland War

188524

## Lecturers



prof. dr. sc.  
Tihomir Cipek



prof. dr. sc.  
Zdravko Matic

## Course Description

The aim of the course is to introduce students to the Croatian Homeland War of Independence (1991-1995). Croatian the war in Croatia (1991-1995) as a just, defensive and liberation war, and European and world historiography defined it as the "Croatian War of Independence". Through examples from the Homeland War, based on the analysis of the study of military operations and actions and other aspects of war, enable students to develop critical thinking in dealing with specific tactical and operational problems.

## Study Programmes

» Military Engineering (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Define the key developments in the reasons and causes of the war in Croatia
2. Define the importance of the struggle for independence and the creation of the Croatian state
3. Define the changes in the conduct of war and be able to critically analyse military operations From Homeland War
4. Define the relationship of enemy forces and their military tactics in Phase I (armed Aggression to the Republic of Croatia)
5. Define the military tactics of enemy forces in the Second Phase of the War (1992 - 1995) and the defense tactics of the Croatian forces.
6. Define the effectiveness of Croatian forces in the liberation operations of the Homeland War
7. Define the importance of Croatian liberation operations for the peaceful reintegration of the Croatian Danube region

## Study Programme Learning Outcomes

### Screening of student's work

- 1 ECTS Lectures attendance
- 1 ECTS Midterm exam
- 1 ECTS Seminar report

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- 3 ECTS

|                  |             |
|------------------|-------------|
| ECTS Credits     | 3.0         |
| English Level    | L1          |
| E-learning Level | L1<br>(10%) |
| Study Hours      |             |
| Lectures         | 30          |
| Seminar          | 15          |

## Teaching Assistants

Neven Klarić

Damir Stručić

## Grading

The grade in the subject consists of a written exam that carries 75% of the total grade, and a seminar presentation that carries 25% of the total grade. Active participation in seminar discussions influences the final grade. - Written part of the exam is taken through two midterm examinations (1st colloquium and final exam) for the duration of the class, ie. the whole exam within the exam periods. Each exam carries a 50% mark on the overall exam. - If a student receives a negative grade from one of the midterm examinations, she / he may take the exam within the first examination period. - If a student does not appear unjustifiably at one of the midterm examinations, she / he is instructed to take the full exam within the examination deadlines. - The test consists of four questions. The exam consists of eight questions. Each question carries 0-3 points. - Scoring system: - Colloquium: 5-6 = sufficient (2) Full exam: 11-13 = sufficient (2) 7-9 = good (3) 14-19 = good (3) 10-11 = very good (4) 20-22 = very good (4) 12 = excellent (5) 23-24 = excellent (5) - The final grade is formed as follows: average grade from two midterms / total exam x 0.75 + grade from seminar paper x 0.25. - Example: first colloquium = grade 3, second



## Forms of Teaching

### » Lectures

» All students are required to attend lectures and seminar classes. The number of absences allowed is defined in the Rulebook on Studying at University Study Programs for the Armed Forces of the Republic of Croatia.

### » Seminars and workshops

» Seminar work (presentation, participation in discussions)

## Week by Week Schedule

1. The breakup of the Socialist Federal Republic of Yugoslavia (SFRY), the verbal rebellion of Serbs in Croatia; the armed rebellion of Serbs with terrorism)
2. Homeland War (just, defensive, liberation), 3 phases of war: first phase: armed aggression on the Republic of Croatia, second phase: neither war nor peace phase; the third phase; the liberation operations of the Croatian Army
3. Conflicting Parties: Croatian Forces, Yugoslav People's Army (JNA), Serbian Krajina Army (SVK)
4. War Plans of Conflicting Parties (Yugoslav People's Army, Croatian Army, Serbian Krajina Army)
5. The first phase of the war: Armed aggression against the Republic of Croatia (main battlefields: East Slavonian, West Slavonian, Banovinsko-Pokursko, Karlovac-Kordun, Ličko, North Dalmatian, South)
6. Battle of Vukovar (August 24, 1991 - November 18, 1991); Operation Otkos 10 and Operation Hurricane
7. 1. Colloquium
8. Second phase of the war: Phase of neither war nor peace (from the Sarajevo ceasefire to Operation Winter 94): Miljevci, Tiger, Liberation Land, Konavle, Vlastica
9. Operation "Maslenica", Pocket 93 "
10. Third phase of the war: Operations: "Cincar", "Winter 94th", "Jump - 1st", Jump - 2",
11. Operations "Flash", "Summer 95"
12. Operation Storm, (Zagreb area, Karlovac area, Gospic area and Split area)
13. Final operations: "Maestral", "Southern move"
14. Peaceful reintegration of the occupied areas of Eastern Slavonia
15. FINAL EXAMINATION (2nd colloquium)

colloquium = grade 2.

Assessment from the written part of the exam:  $3 + 2 = 5$ ;  $5: 2 = 2.5 = 3$  Final Rating:  $3 \times 0.75 + 4 \times 0.25 = 2.25 + 1 = 3.25 = 3$   
Seminar presentation: The presentations are held on the topics listed in this syllabus. The presentation should last for 10 minutes and will be held according to the schedule of seminar classes. Presentation instructions are on the "Studomat".

## Literature



Rajko Rakić, Branko Dubravica (2009). *Kratak pregled vojnih djelovanja u Domovinskom ratu 1991.-1995.*, MORH - Hrvatsko vojno učilište "Dr. Franjo Tuđman", Zagreb



Željko Radelić, Davor Marijan, Nikica Barić, Albert Bing, Dražen Živić (2006). *Stvaranje hrvatske države i Domovinski rat*, Školska knjiga



Davor Marijan (2016). *Domovinski rat*, Hrvatski institut za povijest, Despot Ineditus



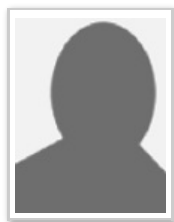
Davor Marijan (2007). *Oluja*, Hrvatski memorijalno-dokumentacijski centar Domovinskog rata

# Intelligence Analytics

188534



## Lecturer



doc. dr. sc.  
Dario Malnar

ECTS Credits 3.0

English Level L3

E-learning Level L1  
(10%)

Study Hours

Lectures 30

Exercises 15

## Associate Lecturers

Tomislav Dokman

Josip Esterajher

Marinko Ogorec

Marin Vrkić

## Grading

The final grade is obtained on the basis of class attendance, presentation of papers and passing of the midterm exam.

## Course Description

The aim of the course is: to define and explain the role and principles of analytics in the modern intelligence process; comparative study of the methodologies and techniques of intelligence analytics and the analytical approach to the security problem in a complex security environment; to explore the psychological and processual constraints and limitations that accompany analytical work in the complex relationship between analytics and users of intelligence; to identify the key competencies of intelligence analysts and the principles, structure and formats of intelligence products.

## Study Programmes

» Military Leadership and Management (Study) (*elective courses, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Explain the concepts and concept of intelligence analytics
2. Explain the ability to analytically approach complex processes in a security environment
3. Apply and structure the available information needed for the analytical process
4. Explain the concept and application of structured analytical techniques
5. Apply a systematic approach that takes into account possible alternative outcomes and reduces the possibility of making erroneous or rejecting well-founded hypotheses
6. Apply the ability to identify threat indicators as a basis for early warning
7. Explain the need to develop awareness of the cognitive, perceptual and procedural constraints that affect analytic judgment
8. Explain the components of the relationship between intelligence analytics and analytics users
9. Apply the methodology of analysis and production of analytical products

## Study Programme Learning Outcomes

### Screening of student's work

0.5 ECTS Lectures attendance

1.5 ECTS Midterm exam

1 ECTS Report

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3 ECTS

## Forms of Teaching

- » Lectures
  - » Presentation of lectures on planned topics.
- » Exercises
  - » Exercises and student presentations.

## Week by Week Schedule

1. Introduction to the course - structure, goals and outcomes. Conceptualization of analytics in the intelligence process and definition of key concepts
2. Introduction to Intelligence Analytics - Analytical Cycle
3. Analytical techniques - definition and types. Demonstration of diagnostic techniques
4. Analytical techniques - presentation of contrarian techniques
5. Analytical Techniques - presentation of imaginative thinking techniques
6. Critical thinking - a methodological concept for improving the quality of thinking in the analytical process
7. Colloquium I
8. Conceptual aspects of security environment analysis, threat assessment and risk assessment
9. Defining a security problem, structuring an analytical question, and hypotheses testing
10. Principles, forms and structure of intelligence analysis and intelligence reporting
11. Analytical mistakes - limitations of the analytical process
12. Key competencies of intelligence analysts - abilities, knowledge and skills
13. Aspects of the relationships between decision makers and intelligence analysts
14. The future of intelligence analysis
15. Final Exam

## Literature



Kopal, R., Korkut, D. (2011). *Kompetitivna analiza 1- poslovnne i ekspertne kvantitativne analitičke tehnike*, Comminus i Effectus, Zagreb



Kopal, R., i Korkut, D., (211). *Kompetitivna analiza 2- strukturirane i kreativne analitičke tehnike*, Comminus i Effectus, Zagreb



Richards J. Heuer (1999). *Psychology of Intelligence Analysis*, Center for the Study of Intelligence, Central Intelligence Agency

## Similar Courses

- » Artificial Intelligence for Disease Diagnosis and Information Recommendations, Stanford University

# Logistics Support

188533



## Lecturers



doc. dr. sc.  
Andrija Kozina



prof. dr. sc.  
Goran Đukić

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Exercises        | 15  |

Teaching Assistant  
Ivica Kodžoman

## Grading

10% of the final grade makes participation in the classroom, including participation in the exercises, seminars and the like, 35% make each of the two colloquia in the final grade (interviews), 20% of the final grade makes the knowledge shown on the final exam.

## Course Description

The aim of the course is to acquire, understand and link knowledge on logistical support at a tactical level, to develop autonomy in judging logistical needs and available capabilities, and to develop responsibility for the implementation of logistic support.

## Study Programmes

- » Military Leadership and Management (Study) (*elective courses, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Analyze the OS RH logistic system
2. Explain and differentiate the conditions of the implementation of logistic support
3. Explain and compare the specific logistic support in HRM and HRZ
4. Understand and explain the structure of logistical units
5. Explain the processes and activities of logistical units on the tactical battlefield
6. Identify the elements of the logistical planning system
7. Explain the specificity of logistic support for tactical operations depending on their type
8. Understand and analyze the place and role of logistics in the military decision-making process.

## Study Programme Learning Outcomes

### Screening of student's work

|                              |
|------------------------------|
| 1.5 ECTS Lectures attendance |
| 1 ECTS Midterm exam          |
| 0.2 ECTS Seminar report      |
| 0.3 ECTS Oral exam           |
| <u>3 ECTS</u>                |

## Forms of Teaching

- » Lectures
  - » Classical ex cathedra lecture.
- » Exercises

- » The work of administrative and executive elements of logistics in the process of military decision-making, 15 hours (planning and drafting of logistical documents in the military decision-making process)
- » Independent assignments
  - » The independent task involves the research, development and presentation of seminar work related to issues of the given service

### Week by Week Schedule

1. Logistic system in OSRH.
2. Stationary and Operational Logistics.
3. Maintenance of materiel.
4. Supply.
5. Movement and transport support.
6. Medical support.
7. Construction support
8. Organization of Logistic Support in HRM
9. Organization of Logistic Support in HRZ
10. Logistic company in support of maneuver battalion operation
11. Logistic battalion in support of maneuver unit operation
12. Specificities of logistic support during operations
13. Logistics planning
14. Concept of logistical support of the OS RH units in NATO-led operations
15. Work S-4 / G-4 in Military Decision Making

### Literature



(2015). *ZDP-40: Združena logistika*, GS OS RH, Zagreb



(2016). *Logistics Handbook*, NATO HQ, Brussels

### Similar Courses

- » -, Oxford

# Mechatronics

188517

## Lecturers



prof. dr. sc.  
Željko Šitum



doc. dr. sc.  
Mario Hrgetic

|                  |     |
|------------------|-----|
| ECTS Credits     | 6.0 |
| English Level    | L1  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Seminar          | 45  |

## Teaching Assistants

Juraj Benić  
Mihael Cipek

## Grading

Written exam replaces colloquiums.

## Course Description

The course objective is to get acquainted with modeling, analysis and synthesis of mechatronic systems. After completing the course, students should acquire basic knowledge and skills on the analysis and synthesis of mechatronic products or production processes. This implies knowledge of basic concepts from the mechatronics, knowledge of the basics of modeling and control of mechanical systems, and knowledge of the basic elements of a mechatronic system. The course also aims to introduce students to hydraulic and pneumatic systems, their features and practical application in industry and military engineering. The characteristics of classical, proportional and servo hydraulic and pneumatic systems are explained, and basic components for plant performance are introduced. The subject covers the analysis and control of robotic systems with hydraulic and pneumatic drives, the application of advanced methods in feedback control the fluid technique system and the realization of digital real-time algorithms. It also provides an overview of methods and practical solutions of digital microprocessor control, with reference to digital control elements, microcomputers, connection circuits, sensors and actuators, and time-sensitive (digital) control algorithms. The course objective is also to accompany the theoretical material from lectures with numerous exercises on experimental laboratory systems.

## Study Programmes

» Military Engineering (Study) (*elective group of compulsory subjects, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Define the principles of the feedforward and feedback control of technical systems
2. Explain the model of the mechanical system in a form suitable for control
3. Reproduce your knowledge of basic concepts and components of the fluid power system
4. Explain the performance of controlled hydraulic and pneumatic systems consisting of the drive part (pumps), the control part (valves), the output part (cylinders and motors), the measuring members (sensors) and the control device,
5. Explain the underlying principles and application of control strategies in the open and closed circuit, design and adjust the PID regulator, and apply some advanced methods for control the fluid power system,
6. Develop a hydraulic or pneumatic control system (eg, position, speed, or force regulation) in a practical application.

7. Analyze the performance and operation of a digital microprocessor based control system
8. Explain the basic principles of peripheral units (A / D and D / A converters, digital inputs and outputs, incremental encoder signal counters, PWM signal generators)
9. Apply logical control system and digital PID controller in Matlab / Simulink, STEP 7 and C / C ++ environments

## Study Programme Learning Outcomes

### Screening of student's work

- 2.5 ECTS Lectures attendance
    - 0 ECTS Experimental work
    - 2 ECTS Midterm exam
    - 0 ECTS Written exam
  - 0.5 ECTS Research
    - 1 ECTS Oral exam
    - 0 ECTS Practical work
- 
- 6 ECTS

### Forms of Teaching

- » Lectures
- » Exercises
- » Independent assignments
- » Laboratory

### Week by Week Schedule

1. An Introduction to Mechatronics, a Historical Review.  
Getting acquainted with mechatronic examples: a self-balancing vehicle as an example.
2. Mathematical models of technical systems suitable for control. Transfer function, algebra blocks, model in Matlab / Simulink.
3. System analysis in the time domain.  
Responses to standard input functions. Basic response properties. Damping coefficient and time constants.
4. The basic regulators, the issue of stability and accuracy. PID regulator, stability and accuracy of the control system.
5. Introduction to hydraulics and pneumatic systems, advantages and disadvantages of hydraulic and pneumatic systems. Basic features of classical hydraulics and pneumatic. Basic elements and performance of hydraulic and pneumatic systems. Getting acquainted with the symbols of hydraulic and pneumatic schemes.
6. Proportional hydraulic and pneumatic systems. Basic elements and their features. Control of hydraulic and pneumatic systems by means of proportional valves.
7. Colloquium I.
8. Servo-hydraulics - basic features. Types of servo power. Control of position, speed and force of hydraulic and pneumatic systems (demonstration work).
9. Directions for the development of modern hydraulic and pneumatic systems. Control of robot systems with hydraulic and pneumatic drive.
10. Microprocessor structure, microcomputer elements, and instruction set.  
Industrial programmable logic controllers (PLCs)  
Siemens family S7-200 / 300/1200
11. Input / output concepts, input / output circuits. Executing the control code in the asynchron cycle (scan cycle) and interrupt.

12. A / D and D / A transducers, sensors and signal conditioning circuits, actuators. Examples of logic control, sequential control and dynamic system control using microcontrollers.
13. Introduction to digital control, structure of digital control system, continuous signal sampling and Z transformation. Digital PID regulator. Analysis of signal and control systems in time-discrete domain, application of Z transformation for management system analysis.
14. Additional chapters of mechatronics. Repetition.
15. Colloquium 2.

## Literature



G. Nikolić, J. Novaković  
(2003). *Pneumatika i  
hidraulika II*, Školska knjiga



*Interni nastavni materijal za  
predmet*

## Similar Courses

- » Learning Mechatronics Through Graduated Experimentation, West Point
- » Introduction to Mechatronics, Stanford University



# Military Systems and Processes Quality Management

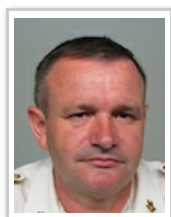
188525



## Lecturers



prof. dr. sc.  
Biserka Runje



izv. prof. dr. sc.  
Mirko Jakopčić

ECTS Credits 5.0

English Level Lo

E-learning Level L2 (20%)

Study Hours

Lectures 30

Exercises 30

## Associate Lecturers

Amalija Horvatić Novak  
Katarina Sabelja

## Teaching Assistants

Ivan Leutar  
Andrej Razumić

## Grading

It is necessary to write two seminar papers in order to be able to take the final written exam.

## Course Description

This course introduces students to contemporary world trends in the field of metrology and quality management in both the civil and military environment.

## Study Programmes

- » Military Engineering (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Apply quality management tools and methods.
2. Apply the fundamental measurement principles.
3. Estimate measurement uncertainty.
4. Use statistical packages to monitor and evaluate the process quality
5. Assess the risk.
6. Create test procedures and quality management processes in a specialized field.

## Study Programme Learning Outcomes

### Screening of student's work

1 ECTS Lectures attendance

2 ECTS Midterm exam

1 ECTS Seminar report

1 ECTS Continuous assessment of knowledge through the application of e-learning.

5 ECTS

## Forms of Teaching

» Lectures

» -

» Exercises

» -

» Laboratory

» Laboratory exercises will be held twice a week in two hour cycles in a laboratory at the FSB.

## Week by Week Schedule

1. Quality in Civil and Military Environment (Quality Definition, Quality Costs, Taguchi Loss Function).  
Example of Taguchi Loss Functions. Calculation of Quality Costs.
2. Basic concepts of engineering metrology.  
The use of hand instruments, measurement errors.
3. Application of engineering metrology.  
Measurements in the military industry.
4. Measurement uncertainty estimation.  
Examples.
5. Statistical process control (SPC) in civilian and military industry.  
Application of statistical methods of quality control in civilian and military industry.
6. Control charts.  
Examples of the application of control charts.
7. Process capability analysis. Capability indices.  
Calculation of process capability indices. An example from the military industrial sector.
8. The first mid-term exam.
9. Lean Six Sigma - Quality Management System.  
Six sigma metrics. Failure modes and effects analysis (FMEA), Fishbone diagram (Ishikawa diagram), Pareto analysis and 8D Method. Application in the system of military technology maintenance.
10. Standardization. Domestic and international civil and military standards.  
Guidelines. Directives.  
Quality management system ISO 9000.  
Discussion.
11. The requirements of ISO 9001: 2015. The requirements of AS / EN 9100.  
Comparison of the requirements of ISO 9001 and AS9100 norms.
12. Environmental Management System ISO 14000. Occupational Health and Safety Management Systems OHSAS 18000.  
Examples of quality management documentation.
13. Risk management in modern military engineering.  
Simulation of the certification process.
14. Methods and tools for risk assessment.  
Examples of risk assessments in modern military engineering.
15. The second mid-term exam.

## Literature



Biserka Runje (2018).  
*Predavanja iz kolegija  
Upravljanje kvalitetom*, Fakultet  
strojarstva i brodogradnje,  
Zagreb

## Additional Literature



Thomas Pyzdek, Paul Keller  
(2014). *The Six Sigma Handbook*

# Operational Research

188515

## Lecturer



prof. dr. sc.  
Goran Đukić

## Course Description

Introducing techniques and models from Operations Research. Mastering linear and integer programming techniques and network problem solving algorithms to address a wide range of problems that arise in military, manufacturing and logistics systems, with an emphasis on military-logistic problems. Introduction to multicriteria decision making methods.

## Study Programmes

- » Military Engineering (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Define and describe the area of operational research and its application possibilities.
2. Determine solutions for production, logistical or military cases by linear graphing modeling model and simplex method for finding the optimal solution.
3. Perform Sensitivity Analysis on Optimal Solutions.
4. Identify realistic situations, especially from the military system, which can be modeled as network problems.
5. Apply appropriate network troubleshooting algorithms.
6. Identify problems for which multicriteria decision-making is required.
7. Apply software tools to solve multi-criteria decision making.

## Study Programme Learning Outcomes

### Screening of student's work

2.5 ECTS Lectures attendance  
3.5 ECTS Written exam  

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6 ECTS

## Forms of Teaching

- » Lectures
  - » Classical ex cathedra lecture.
- » Exercises
  - » Exercises with numerical problems.
- » Independent assignments

|                  |     |
|------------------|-----|
| ECTS Credits     | 6.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 45  |
| Exercises        | 30  |

### Associate Lecturers

Miro Hegedić  
Nataša Tošanović

### Teaching Assistants

Mihael Gudlin  
Tihomir Opetuk

### Grading

Regular attendance in lectures and audit work. Submission of 2 Colleges or Written Examination and Final Oral Exam. Collaborators may substitute a written exam if both colloquia are evaluated positively (min 50% points of the colloquium). The final grade is based on the points from both positive colloquia (with equal shares by 50% points) or written exam.

- » Independent task - seminar based on application of the multi-criteria decision making method.

## Week by Week Schedule

1. Introduction to Operational Research. Methods and Application of OI.
2. Linear programming - a standard problem. Graphical Problem Solving of LP.
3. Simplex method - maximum problem, minimum problem.
4. Application of Sensitivity Analysis in LP.
5. Transportation problem of LP.
6. Integer programming. Branch and bound method.
7. Mid-term 1
8. The basics of graph theory. Classification and basic concepts of graph theory. The problem of the minimum spanning tree. Prim and Kruskal algorithm. The shortest path problem in networks. Dijkstra algorithm, Floyd algorithm.
9. Problem maksimalnog protoka. Ford-Fulkersonov algoritam. Problem protoka minimalnog troška.
10. Vehicle routing problems. Arc routing problems: Chinese Postman Problem (ChPP).
11. Vehicle routing problems. Node routing problems: Travelling Salesman Problem (TSP), Vehicle Routing Problems (VRPs)
12. Introduction to multi-criteria decision making.
13. Review of methods for solving multi-criteria decision making (Electre, Promethee, AHP, ANP).
14. Application of the Expert Choice software tool.
15. Mid-term 2

## Additional Literature



Đukić (2017). *Mrežni problemi – recenzirani nastavni materijal*, FSB



Hiller, Lieberman (2010). *Introduction to Operations Research*, McGraw-Hill



Jaiswal, N.K. (1997). *Military Operations Research - Quantitative Decision Making*, Springer



Schroeder, R. (1999). *Upravljanje proizvodnjom*, Mate, Zagreb



- (2008). *Decision By Objectives*, Expert Choice Inc

## Similar Courses

- » -, Oxford

# Organization of the Health Care Service

188521



## Lecturers



doc. dr. sc.  
Boris Zdilar



prof. dr. sc.  
Ivana Čuković  
Bagić

## Course Description

### Study Programmes

- » Military Engineering (Study) (*elective courses, 1st semester, 1st year*)
- » Military Leadership and Management (Study) (*elective courses, 1st semester, 1st year*)

### Learning Outcomes

On successful completion of the course, students will be able to:

1. Apply knowledge from the fields of military sciences, technique, and information technologies to planning necessary medical support.
2. Plan staffing needs of the units regarding medical personnel, and replenishment needs regarding means of evacuation during defensive and attack operations.
3. Write plans and orders for the implementation of necessary preventive measures in a unit.
4. Plan providing a unit with first aid kits and supplies.
5. Create first aid annual training plan for soldiers.
6. Understand medical support scheme, and document creation based on it.

### Study Programme Learning Outcomes

#### Screening of student's work

|                               |
|-------------------------------|
| 0.25 ECTS Lectures attendance |
| 1 ECTS Midterm exam           |
| 1 ECTS Written exam           |
| 0.25 ECTS Seminar report      |
| 0.5 ECTS Oral exam            |
| <hr/>                         |
| 3 ECTS                        |

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Seminar          | 5   |
| Exercises        | 10  |

#### Associate Lecturers

Ivan Domagoj Drmić  
Davorka Perić  
Žarko Rašić  
Lucija Svetina

#### Grading

Throughout the course of the teaching process, the student will be monitored, examined, and evaluated. The student takes two quizzes consisting of a written and oral exam. Regular attendance in classes and submission of a seminar paper are also required.

## Forms of Teaching

### » Lectures

» Familiarization with the role and importance of medical service in the armed forces, and its historical development. Overview of different medical service organization models, and consequences for the conduct of military operation outcomes. Familiarization with the changes in military health doctrine in modern warfare, and with the models for assessing medical support capacities required. Understanding the relationship between health care and logistics in the conduct of expedition operations, and in asymmetric war conflicts, with an emphasis on military-logistic issues.

### » Seminars and workshops

» Plan for casualty evacuation from battlefield

### » Exercises

» Medical support request creation  
 Providing first aid  
 Plan for providing a unit with medical supplies  
 Disaster relief plan  
 Medical support type decision making process

### » Other

## Week by Week Schedule

1. Introduction to medical support
2. Introduction to the role and significance of the healthcare service in the armed forces, along with its historical development.
3. Commander's responsibility for medical fitness of personnel
4. Oral health protection measures
5. The basics of medical logistics
6. Basic first aid training programming and planning
7. Mid-term exam 1
8. Evacuation planning and organizing
9. International humanitarian law
10. Casualty estimates in operations
11. Medical support planning in operations
12. Mass casualty incident relief organization
13. Armed forces preventive (medical and dental) health care
14. Medical support components and branch specialties
15. Mid-term exam 2

## Literature



*AJP 4.10 Medical Support Doctrine ed B.*



*AJMedP-1 Allied Joint Medical Planning Doctrine*



*MC 326/2 NATO Principles and Policies of Operational Medical Support*



*Pravilnik o zdravstvenoj potpori u OS RH (NN 134/15)*



*Program posebne zdravstvene zaštite pripadnika OS RH koji sudjeluju u OPM*



*HRVN 2122 Temeljna obuka iz zbrinjavanja stradalih i osnova higijene cjelokupnog vojnog osoblja (AMedP-8.15)*



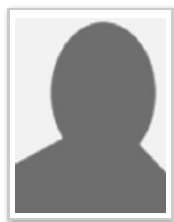
*HRVN 2126 Sredstva i kompleti za prvu pomoć i hitnu medicinsku pomoć*

# Planning and Managing Defence Resources

188514



## Lecturers



prof. dr. sc.  
Robert Fabac



doc. dr. sc.  
Davor Ćutić

ECTS Credits 3.0

English Level L1

E-learning Level L1 (5%)

Study Hours

Lectures 30

Seminar 15

## Teaching Assistants

Slobodan Čurčija

Ivica Kodžoman

Ante Kožul

Dubravko Sedmak

Tina Štengl

## Grading

To exercise the right to a positive evaluation, it is necessary to achieve a level of points of 50% through continuous monitoring, and certain minimum levels for the elements of monitoring.

## Course Description

Defense resource planning and management will enable students/cadets to understand the accomplishments, design of a successful and advanced military organization, through the perspective of rational management of organizational resources. They will be able to describe and analyze the state of resources and capabilities based on the acquisition of knowledge of organizational theory, through the perspectives of a "resource-based view" and "resource dependency theory." They will perceive ways and models of building and managing resources. Students will learn about and analyze the important notion of organizational/military capabilities that provides competitive advantage (or military superiority). They will have the experience of participating in a strategic resource management game based on an interactive scenario, with a live opponent and for a limited time (NPS model). In terms of military resources, the basics of resource planning will be presented through the presentation of the Planning, Programming and Budget Execution System (PPBS). Within this system, the procurement processes for the needs of the armed forces, financial operations and financial plan, and material operations and responsibilities will be specifically analyzed.

## Study Programmes

- » Military Engineering (Study) (*required course, 1st semester, 1st year*)
- » Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Describe the characteristics of material and intangible resources and human resources
2. Define the notion of organizational capabilities and especially military capabilities
3. Analyze possible ways of developing defense capabilities
4. Define what "defense programs" are and what they contain
5. Describe the relationship between strategy, plans, programs and budgets in the organization
6. Analyze possible approaches to defense planning
7. Compare and evaluate variants in interactive decision making, regarding resource management
8. Describe the procurement process in the armed forces
9. Define responsibility for material resources

## Study Programme Learning Outcomes



## Screening of student's work

- 0.2 ECTS Lectures attendance
- 2 ECTS Midterm exam
- 0.5 ECTS Seminar report
- 0.3 ECTS Project

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- 3 ECTS

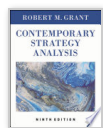
## Forms of Teaching

- » Lectures
  - » classic lectures using a powerpoint presentation
- » Seminars and workshops
  - » seminar presentations and written seminar papers
- » Exercises
  - » The exercises are performed through a TEMPO resource management game (originally from NPS Monterey, US)
- » Partial e-learning
  - » switch to a distance learning model if needed
- » Independent assignments
  - » problem tasks for more advanced learners

## Week by Week Schedule

1. Introductory lesson  
Resources in the organization
2. Human resources and material resources
3. Organizational resource theory
4. Organizational capabilities
5. Defense (military) resources and capabilities
6. Resource management through defense plans and programs
7. Resource management in military interactions
8. Standardization
9. Introduction to material and financial management
10. Organization of financial profession in CAF
11. Material business processes
12. Financial business processes and financial plan
13. Programming
14. Write-off and disposal
15. Planning, programming and budgeting system

## Literature



Grant, R.M. (2010). *Contemporary Strategy Analysis: Concepts, Techniques, Applications*, John Wiley & Sons Ltd,

## Additional Literature



Fabac, R. (2017). *Dizajniranje organizacije i upravljanje promjenama*, Naklada SLAP & FOI Varaždin



Donald B. Rice (1980). *Defense Resource Management*, Government Printing Office Stock, US



D. J. Bloomberg, S. LeMay, J. B.  
Hanna (2006). *Logistika*, Mate,  
Zagreb (prijevod)

### Similar Courses

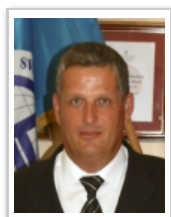
- » Defense Resources Management Course (DRMC), Oxford
- » Project Management, West Point

# Quartermaster Corps

188537



## Lecturers



izv. prof. dr. sc.  
Luka Mihanović



prof. dr. sc.  
Robert Fabac

ECTS Credits 3.0

English Level L1

E-learning Level L1 (5%)

Study Hours

Lectures 30

Exercises 15

Associate Lecturers

Ante Kožul

Ružica Pavić-Kevrić

## Course Description

The objective of the course is to acquire, understand and integrate knowledge related to the organization, implementation and management of the supply of material resources as well as the services of the Intendant Military Service. The objective also includes reviewing the implementation of the tasks of the Intendant Service in both stationary and field conditions.

## Study Programmes

» Military Leadership and Management (Study) (*elective courses, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Analyze the organization, goals and tasks of the Intendant Service
2. Distinguish between intendant MS and explain the specificity of supply
3. Explain and understand MS Class I and Class II storage
4. Explain and understand the organization of nutrition and healthy food as well as the preparation of food in the field
5. Analyze and explain the methods and ways of maintaining, transporting and writing off MS Intendant Service
6. Describe and explain the organization and implementation of service activities

## Study Programme Learning Outcomes

### Screening of student's work

0.3 ECTS Lectures attendance  
2 ECTS Midterm exam  
0.7 ECTS Practical work  

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3 ECTS

## Forms of Teaching

- » Lectures
- » Exercises
- » Independent assignments

## Week by Week Schedule

1. Organization, goals, tasks of the Intendant Service

2. Intendant MS (Material Assets) and Supply
3. MA Class I Storage
4. MA Class II Storage
5. Meals in army
6. Healthy diet
7. Food preparation in the field
8. Organization and implementation of service activities
9. Optimization of the Intendant Service Processes - Operational Research
10. Inventory management
11. Economical order quantity
12. Queues
13. Optimizing service capacity
- 14.
- 15.

## Literature



United States Government  
US Army (2013). *Field  
Manual FM 4-40 (FM 10-1)  
Quartermaster Operations*



S. Brown, R. Lamming, J.  
Bessant and P. Jones (2005).  
*Strategic Operations  
Management*, Elsevier  
Butterworth-Heinemann

# Security and Force Protection

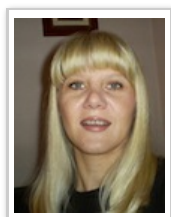
188536



## Lecturers



Gordan Akrap,  
dr. sc.



doc. dr. sc.  
Dijana Gracin

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Exercises        | 15  |

## Associate Lecturers

Boženko Đevoić  
Dario Malnar  
Marin Vrkić

## Teaching Assistant

Mladen Trnski

## Grading

Assessment of exercises and monitoring of personal efforts during discussions (40%), creativity and organizational skills of participants (10%), written assessment (50%). A positive final assessment concludes provided that the marks in all elements of assessment is positive. The arithmetic mean of all grades given conclusive assessment of the subject

## Course Description

Understand the significance and role of intelligence activities, counterintelligence protection and security support during planning and CAF employment. Analyse the process and the specifics of force protection in order to resist the threats and security risks.

## Study Programmes

» Military Leadership and Management (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Categorize cognitive tools used in the development of analytical products (critical and creative reasoning).
2. Recognize the importance of the high-quality relationship between the commander (trust) and intelligence staff (expertise)
3. Combine the methods for a comprehensive analysis of the contemporary operational environment
4. Explain the tasks of intelligence personnel in certain phases of the military decision-making process
5. Categorize the intelligence cycle and the decision-making process
6. Identify the specifics of counterintelligence protection and security support.
7. Apply preventive security measures.
8. Use the elements of force protection

## Study Programme Learning Outcomes

### Screening of student's work

- o ECTS Lectures attendance
  - o ECTS Midterm exam
  - 2 ECTS Written exam
  - 1 ECTS Practical work
- 
- 3 ECTS

## Forms of Teaching

- » Lectures
  - » focus on understanding the terms and concept of intelligence analytics; Identification and analyses of complex problems in a military environment
- » Exercises
  - » Case study
- » Multimedia and the internet
  - » Teaching support involving e-learning with platforms for solving problem tasks that students do individually or in groups in their extracurricular time and present or submit them using the e-learning system.

## Week by Week Schedule

1. Intelligence and understanding the contemporary operational environment, 2 hours (characteristics, methods, variables, influence factors, effects, actor analysis)
2. Intelligence disciplines, 2 hours (HUMINT, SIGINT, OSINT, IMINT)
3. Intelligence disciplines, 2 hours (HUMINT, SIGINT, OSINT, IMINT)
4. Intelligence as a combat/joint function, 2 hours (JISR/ISTAR)
5. Intelligence cycle, 2 hours (managing intelligence requirements and collection of data, phases of the intelligence cycle/intelligence operation, procedures within the phases of the cycle)
6. Intelligence Psychology, 2 hours (cognitive tools in the development of intelligence products)
7. Preliminary exam 1
8. Commander and Intelligence, 2 hours (trust and expertise relationship)
9. Intelligence and System Organization in the CAF, 2 hours (intelligence principles, components and characteristics, organization of the system in CAF)
10. Counterintelligence Protection (CP), 2 hours (military dimension of security, role and significance of CP, jurisdiction, relation between CP and HUMINT, CP as an intelligence function, counterintelligence cycle, counterintelligence measures)
11. Security Support (SS), 2 hours (security threats, security threats opposition, security support principles, preventive security protection, force protection planning, risk management)
12. Force protection, 2 hours (and force protection principles, elements and process, identification of threats and risks, vulnerability and risk assessment, force protection measures, force protection planning, risk management)
13. Intelligence preparation of operational environment/battlefield, 2 hours (phases, steps and sub-steps, with the intelligence cycle)
14. Intelligence support to CAF Operations, 2 hours (joint operations support, special operations support, stabilization operations support and support of counterinsurgency operations)
15. Preliminary exam 2

## Literature



(2014). *ZDP 2.0 (2014), Obavještajno djelovanje, protuobavještajna zaštita i potpora sigurnosti*, GS OS RH, Zagreb, GS OS RH



(2015). *ZDP 2.1 (2015), Obavještajni postupci*, GS OS RH



(2016). *AJP-2 (2016), Allied Joint Doctrine for Intelligence, Counterintelligence and Security*, NATO



(2015). *AJP-3.14 (2015), Allied Joint Doctrine for Force Protection*, NATO

## Similar Courses

» -, Oxford

# Selection and Behaviour of Materials in Exploitation

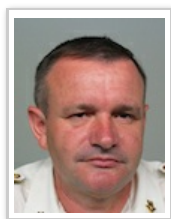
188527



## Lecturers



prof. dr. sc.  
Željko Alar



izv. prof. dr. sc.  
Mirko Jakopčić

ECTS Credits 3.0

English Level L3

E-learning Level L2 (20%)

Study Hours

Lectures 30

Exercises 15

Associate Lecturer

Irena Žmak

Teaching Assistants

Ivan Leutar

Daniel Pustički

Katarina Sabelja

Grading

Grading: During semester, students will be monitored and evaluated. Students will be given a score of two colloquiums and final exam. To obtain a positive final score, all components must be rated positive. Obligations: Regular class attendance. Take colloquiums and the final exam

## Course Description

Earning of knowledge for the analysis and assessment of the behavior of materials in the conditions of various forms of exploitation and tribological processes and their interaction. Identifying the causes of structural parts' failures in operating conditions, identifying the causes of breakage using various methods of analysis and estimating the service life of the structure based on the influential parameters during operation. Adoption of the methodology of quantitative material selection in the established working conditions in order to select the optimal material. Introduction into computer systems for material selection as well into available online database of material properties. Getting to know the materials for the production of selected portions of both non-combat and combat means of military equipment.

## Study Programmes

» Military Engineering (Study) (*required course, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Analyze the states of damage and wear on the material appeared during exploitation and identify their causes.
2. Define tribological wear processes, ie processes of mechanical, thermal and chemical action that occur in real conditions of application.
3. Apply and select appropriate methods for damage analysis and assess the durability of the structure.
4. Define the requirements of material for specific application conditions for different forms of mechanical stress, operating temperature, forms of wear and corrosion.
5. Apply different quantitative methods of material selection and optimization.
6. Use software packages and online databases to select the optimal material.

## Study Programme Learning Outcomes

### Screening of student's work

0.5 ECTS Lectures attendance

2 ECTS Midterm exam

0.25 ECTS Written exam

0.25 ECTS Oral exam

---

3 ECTS



## Forms of Teaching

- » Lectures
  - » Lectures in the classroom and on-line.
- » Exercises
  - » Exercises in the laboratory at the faculty (FSB)
- » Partial e-learning
  - » Combined e-learning
- » Field work
  - » In an overhauling workshop
- » Independent assignments
  - » There are no seminar papers

## Week by Week Schedule

1. Introduction to the behavior of materials in the exploitation and the basic causes of failures and damage. Features of exploitation conditions of military combat and non-combat equipment.
2. Causes of wear and damage of structural parts and materials used to fabricate selected combat and non-combat technical systems.
3. Analysis procedure of wear and damage. Basics of fractography. Macro and micro fracture surface analysis.
4. Failure of the function of machine parts and parts of combat and non-combat technical systems due to material fatigue and increased and high operating temperatures.
5. Failure of the function of machine parts and parts of combat and non-combat technical systems due to corrosion and various wear mechanisms.
6. Maintenance of military systems as a prevention of the wear and damage development.  
Methods for estimating the service life of parts and systems.
7. 1st colloquium
8. Requirements on the product and material. Material selection criteria: functionality and manufacturability of military equipment systems.
9. Material selection criteria: cost, standardization, availability, aesthetics, environmental acceptability.
10. Relevant properties, parameters and material quality features of the military equipment components.
11. Quantitative methods of the material selection and optimization.
12. Graphic maps of material properties (Ashby method).
13. Computer-aided material selection systems: online information and CAMS (Computer aided Materials Selection) systems.
14. The choice of technological processes for selected types of materials.
15. 2nd colloquium

## Literature



Mladen Franz (1998).  
*Mehanička svojstva materijala*, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu



Vinko Ivušić (1998).  
*Tribologija*, Hrvatsko društvo za materijale i tribologiju



Tomislav Filetin (2000).  
*Izbor materijala pri razvoju proizvoda*, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu



Mirko Jakopčić (2009).  
*Trošenje cijevi topničkih oružja, priručnik*, MORH-Glavni stožer OS RH

# Training Management

188504



## Lecturers



prof. dr. sc.  
Dario Matika



prof. dr. sc.  
Robert Fabac

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Exercises        | 15  |

## Associate Lecturers

Svjetlana Adamko  
Robert Baraba  
Stipo Semren

## Course Description

The goal of the course is to acquire knowledge and skills necessary for initial officer duties in the field of Training Management in the current national and multinational environment and operations. Students are expected to gain knowledge and understand a creative and critical approach in the Training Management process in accordance with the legal regulations of the Republic of Croatia and NATO standards. Through the integration of theoretical knowledge and practical examples at the tactical level, they must comprehend the work and role of platoon commanders, which is based on responsibilities and duties, behavior, and the application of basic skills in planning, preparation, and implementation of training in everyday work. Students will develop specific competencies through exercises and independent work according to their abilities in the planning, preparation, and implementation of training events.

## Study Programmes

- » Military Engineering (Study) (*required course, 1st semester, 1st year*)
- » Military Leadership and Management (Study) (*required course, 1st semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Recognizing general military rules in everyday work and training involves
2. Effectively communicate, organize, and plan the work and training of basic tactical units.
3. Know how to organize and conduct a suitable briefing for each step of the training process
4. Know how to organize and implement a system of lessons learned in everyday work, planning, management, training, and time.
5. Know how to distinguish exercises and their role in training, and apply acquired knowledge in solving tactical problems.
6. Develop the ability for continuous and individual learning and teamwork.
7. Explain the significance and interdependence of planning, implementation, and evaluation of training with personnel during the process.

## Study Programme Learning Outcomes

## Screening of student's work

- 0.5 ECTS Lectures attendance
  - o ECTS Experimental work
  - 1 ECTS Midterm exam
  - 1 ECTS Written exam
- 0.5 ECTS Practical work
- 3 ECTS

## Forms of Teaching

- » Lectures
- » Exercises
- » Independent assignments

## Week by Week Schedule

1. Lectures: Introductory Lecture 2:  
Introduction to the subject, the professor, lecturers, and exercises;  
familiarization with the dynamics and content of the lectures, conditions and obligations of participants, and the evaluation and grading system.  
Training management system (role, development, and significance of military training, history of military training, training management cycle, commander's responsibility for training, both in the overall training process).  
  
Organization of training at the tactical level.
2. Combat-Focused Training, 2:  
The concept of combat-focused training, principles, and missions.  
List of tasks crucial for the mission, tasks, and objectives.  
  
Development of the combat-focused training concept, as well as principles, missions, and the list of tasks important for the mission and objectives.
3. Training Planning Part I, 2:  
Planning documents. The process of creating a training plan, steps in the training planning process, and training event planning.  
  
Creation of planning documents for training.
4. Training Planning Part II, 2:  
The process of training planning and management.  
The role and responsibility of the commander in training.  
  
Creation of orders for training.
5. Planning - Training Documentation, 2:  
Long-term training calendar, Short-term training calendar, Near-term training calendar, and weekly training schedules.  
  
Analysis and application of training documentation
6. Preparation for Training Implementation, 2:  
Training assessment.  
Activities after training and analysis post-action.  
  
Analysis of preparation and implementation of training and training events.
7. Exam I  
  
Presentation and analysis of the first exam.
8. Training Assessment, 2:  
Purpose and significance of training assessment.  
Organizational training assessment.  
  
Group work on the analysis and assessment of training.

9. Evaluation - Training Assessment 2:  
Types and forms of training assessment: informal and formal, as well as internal and external evaluation of training and training events.  
  
Purpose and significance of training and training event assessment.
10. Lectures: Military Exercises Part I, 2:  
Military exercises - instructions on military exercises.  
  
Preparation and analysis of military exercises.
11. Military Exercises Part II, 2:  
Military exercises - types, categories, and levels of military exercises in training.  
  
Objectives, significance, and implementation of military exercises.
12. Military Briefings 2:  
Military briefings and analysis post-action during training implementation - types of military briefings, steps during preparation and conduct of briefings, formal and informal analysis, advantages of conducted analysis, implementation of analysis, and reports.  
  
Military briefings in training.
13. Trends in the Development of Modern Military Training, 2:  
Simulations, simulation models, and simulators in military training. Modern tools and aids.  
  
Visit to the Simulation Center of the Croatian Armed Forces.
14. Lessons Learned, 2:  
The system of lessons learned using the example of military training.  
  
Process of lessons learned:  
Filling out observation forms, analysis of completed forms, implementation of lessons learned.
15. Exam 2  
  
Presentation and analysis of the second exam.

## Literature

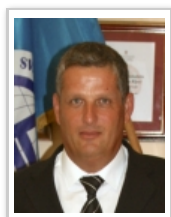


(2005). *Doktrina obuke OS RH*,  
GS OSRH,, GS OS RH

# Transport Service

188538

## Lecturers



izv. prof. dr. sc.  
Luka Mihanović



izv. prof. dr. sc.  
Ratko Stanković

## Course Description

Assess and recommend the application of modern transportation technologies in the transportation process. Present the location, role, and work of the maneuver unit. Outline the role and tasks of the transport department in planning, organizing and conducting admissions, placement, continued movement and integration in the field of operations. Explain modern transportation technologies in road, rail and air transport. Introduce theoretical knowledge in command, planning, and various logistical functional areas while planning transportation operations at the strategic, operational, and tactical levels. Outline role of the Chief of Staff and Logistics Staff during the planning, preparation, execution, and judgment of the flow of transportation and logistics operations.

## Study Programmes

» Military Leadership and Management (Study) (*elective courses, 2nd semester, 1st year*)

## Learning Outcomes

On successful completion of the course, students will be able to:

1. Describe the organization of the Transport Service in the Croatian Army
2. Outline transport logistics in relocating troops and LOGPAC
3. Recognize different levels and models of transport mobility
4. Explain multimodal and integral transport
5. Explain modern transport technologies in road, rail, sea and air transport
6. Describe RSOM&I reception, accommodation and further movements and integration of troops
7. Predict logistic demands of transport means movements
8. Apply information technology LOGFAS
9. Outline mobilization of transport unit

## Study Programme Learning Outcomes

### Screening of student's work

- 1.5 ECTS Lectures attendance
- 0.5 ECTS Midterm exam
- 0.5 ECTS Written exam
- 0.5 ECTS Oral exam
- 3 ECTS

|                  |     |
|------------------|-----|
| ECTS Credits     | 3.0 |
| English Level    | Lo  |
| E-learning Level | L1  |
| Study Hours      |     |
| Lectures         | 30  |
| Exercises        | 15  |

Associate Lecturer  
Jadranko Tuta

Teaching Assistants  
Alen Gospočić  
Ivica Kodžoman

### Grading

10% of the final grade is based on class participation, including participation in exercises, preparation of seminar papers, and similar activities. Each of the two quizzes (mid-term exams) contributes 35% to the final grade, and the knowledge demonstrated in the final exam makes up 20% of the final grade.

## Forms of Teaching

### » Lectures

» The lectures follow the material presented in the mandatory literature and are conducted using specialized presentation tools and templates developed by the course instructors. Student interaction is encouraged during the lectures, and at the end of each lecture, a discussion on the presented material is planned.

### » Exercises

» Auditory exercises are conducted by solving numerical problem tasks to enable students to plan transport operations at the strategic, operational, and tactical levels. Laboratory exercises involve students solving problem tasks using available software packages. Students are encouraged to actively participate and discuss the issues being addressed.

## Week by Week Schedule

1. Introduction to the Traffic Service, 2 hours (Introductory lecture (1 hour): introduction to the subject, lecturer, and exercise instructors; familiarization with the dynamics and content of lectures, conditions, and obligations of participants, as well as the evaluation and grading system. Organization of the traffic service 1 (organization and structure of the traffic service of the Armed Forces of the Republic of Croatia).
2. Traffic Logistics, 2 hours (mastery of spatial and temporal components in the process of moving armed forces, LOGPAC, goods - substrates).
3. Traffic Support, 2 hours (movement, transportation, levels of mobility, transportation models, transportation control).
4. Multimodal and Integrated Transport, 2 hours (history and definition of intermodal transport, integrated transport, pallets).
5. Modern Transport Technologies in Road Traffic, 2 hours (types of road traffic operations, intermodal operations, selection of transport networks).
6. Modern Transport Technologies in Railway Traffic, 2 hours (phases of railway operations, methods of conducting operations, terminals).
7. Modern Transport Technologies in Maritime Traffic, 2 hours (planning, utilization of maritime transport, maritime terminals).
8. Modern Transport Technologies in Air Traffic, 2 hours (airspace control, air bridge and delivery methods, inbound airport operations).
9. RSOM&I Receiving Accommodation and Further Movement, 2 hours (definition, elements, principles, and factors, implementation, support).
10. Information Technology LOGFAS System (ADAMS, EVE, CORSOM), 2 hours (concept, description, data processing tools, planning, and analysis).
11. Deployment and Force Placement in PO, 2 hours (Planning deployment and redeployment, Movement planning, Movement to the embarkation port, Movement to the disembarkation port, Movement, Area of assembly).
12. Predicting Logistics Requirements for the Movement of Transport Vehicles in the Operational Area, 2 hours (demand for forecasting at three levels of logistics, forecasts as input for logistics and transportation planning, factors influencing uncertainty, framework for logistics forecasting system).
13. Preparation of Force Transportation for MVO, 2 hours (fundamental concepts, objectives, and tasks, protection and security of force transportation, exceptional hazards - sources - protective measures).
14. Role and Work of Transportation Officers in the Decision-Making Process, 2 hours (traffic security and support within the logistical support of maneuver units).
15. Mobilization of the Transportation Unit, 2 hours (general provisions on mobilization, the role of traffic and transportation in mobilization, mobilization preparations, planning and organizing traffic security for mobilization, mobilization documents).

## Literature



(2011). *GS OS RH: ZDP 40 - Doktrina logističke potpore, GS OS RH, Zagreb*



(2004). *AMovP 1(A) Cestovni promet i upravljanje prometom*



(2002). *AMovP 3(A) Dokumenti prometa i transporta – pojmovi i definicije*



(2002). *AMovP 4 Tehnički aspekti vojnog transporta željeznicom*



(2005). *AMovP 5 Multimodalni transport*



(2013). *RSOM&I Prijem, smještaj, nastavak kretanja i integracija snaga u NATO vođenim operacijama, Doktrinarni priručnik, ZzP OSRH*

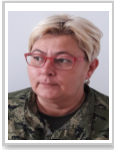


(2002). *Suvremene transportne tehnologije,, FPZ*

## **Lecturers**



**Svjetlana Adamko**, mag. pol.



-Training Management (P, A)

prof. dr. sc. **Željko Alar**



-Selection and Behaviour of Materials in Exploitation (P)

**Robert Baraba**, dipl. ing. agr.



-Training Management (P, A)

izv. prof. dr. sc. **Hrvoje Cajner**



-Computer Simulations and Modelling (P, A)  
-Computer Simulations and Modelling D (P)

doc. dr. sc. **Mihael Cipek**



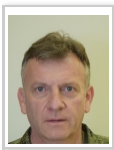
-Mechatronics (S)

**Miro Čolić**, mag. educ. phys.



-Computer Simulations and Modelling (P)  
-Computer Simulations and Modelling D (P, L)  
-Crisis Management (P, A)

dr. sc. **Slobodan Čurčija**



-Planning and Managing Defence Resources (S)

prof. dr. sc. **Željko Dobrović**



-Crisis Management (P, A)

dr. sc. **Ivan Domagoj Drmić**



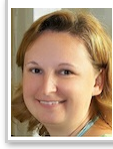
-Organization of the Health Care Service (P, S, A)

**Gordan Akrap**, dr. sc.



-Fundamentals of Strategy (P)  
-Security and Force Protection (P)

prof. dr. sc. **Danijela Ašperger**



-Contemporary Methods of Analysis and Establishing Chemical Compound Structure (P)

dr. sc. **Juraj Benić**



-Mechatronics (S)

dr. sc. **Ivana Cetina**



-Contemporary Methods of Analysis and Establishing Chemical Compound Structure (L)

prof. dr. sc. **Tihomir Cipek**



-Homeland War (P)

prof. dr. sc. **Ivana Čuković Bagić**



-Organization of the Health Care Service (P)

doc. dr. sc. **Davor Ćutić**



-Fundamentals of Strategy (P)  
-Planning and Managing Defence Resources (P, S)

dr. sc. **Tomislav Dokman**



-Intelligence Analytics (P, A)

mr. sc. **Boženko Devoić**



-Security and Force Protection (P)

prof. dr. sc. **Goran Đukić**

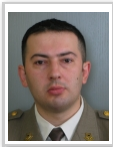
- Computer Simulations and Modelling (P)
- Computer Simulations and Modelling D (P)
- Logistics Support (P)
- Operational Research (P)

dr. sc. **Josip Esterajher**

- Intelligence Analytics (P, A)

prof. dr. sc. **Robert Fabac**

- Planning and Managing Defence Resources (P, S)
- Quartermaster Corps (P)
- Training Management (P)

**Tomislav Fabijančić**, dipl. ing.

- Command and Control (P, A)

Suzana Filjak, prof.



- Contemporary Military Concepts (P, A)

prof. dr. sc. **Tatjana Gazivoda Kraljević**

- Contemporary Methods of Analysis and Establishing Chemical Compound Structure (S)

**Dalibor Gernhardt**, mag.ing.el.

- Fundamentals of Branch and Service Employment (P, A)

dr. sc. **Alen Gospočić**

- Transport Service (A)

doc. dr. sc. **Dijana Gracin**

- Security and Force Protection (P)

dr. sc. **Mihael Gudlin**

- Operational Research (A)

doc. dr. sc. **Miro Hegedić**

- Operational Research (P)

**Vladimir Horvat**, mag. ing. aedif.

- Fundamentals of Branch and Service Employment (P, A)

dr. sc. **Amalija Horvatić Novak**

- Military Systems and Processes Quality Management (P, A)

prof. dr. sc. **Marijana Hranjec**

- Contemporary Methods of Analysis and Establishing Chemical Compound Structure (P)

doc. dr. sc. **Mario Hrgetić**

- Mechatronics (P, S)

izv. prof. dr. sc. **Mirko Jakopčić**

- Military Systems and Processes Quality Management (P)
- Selection and Behaviour of Materials in Exploitation (P)

**Valnea Kerbavčić Degač**, mag. educ. geogr.

- Fundamentals of Branch and Service Employment (P, A)

**Neven Klarić**

- Homeland War (S)

prof. dr. sc. **Božidar Kliček**

-Command and Control (P)

dr. sc. **Mario Klun**

-Fundamentals of Branch and Service Employment (P, A)

dr. sc. **Valentina Ključarić**-Contemporary CBRN Threats and Toxicological Consequences (P, S)  
-Contemporary Methods of Analysis and Establishing Chemical Compound Structure (S)**Ivica Kodžoman**, dipl. ing.-Logistics Support (A)  
-Planning and Managing Defence Resources (S)  
-Transport Service (A)doc. dr. sc. **Andrija Kozina**-Command and Control (P)  
-Contemporary Military Concepts (P, A)  
-Logistics Support (P, A)mr. sc. **Ante Kožul**-Planning and Managing Defence Resources (S)  
-Quartermaster Corps (P, A)doc. dr. sc. **Svjetlana Krištafor**

-Contemporary Methods of Analysis and Establishing Chemical Compound Structure (P)

**Bernarda Krulić Mutavčić**, dipl. ing. fiz.

-Fundamentals of Branch and Service Employment (P, A)

prof. dr. sc. **Darko Landek**-Computer Simulations and Modelling (P, A)  
-Computer Simulations and Modelling D (P, L)**Ivan Leutar**, dipl. ing.-Military Systems and Processes Quality Management (A)  
-Selection and Behaviour of Materials in Exploitation (A)**Leonardo Lorusso**, dipl. ing.

-Fundamentals of Branch and Service Employment (P, A)

doc. dr. sc. **Dario Malnar**-Intelligence Analytics (P)  
-Security and Force Protection (P)prof. dr. sc. **Zdravko Matić**

-Homeland War (P)

prof. dr. sc. **Dario Matika**

-Training Management (P, A)

izv. prof. dr. sc. **Luka Mihanović**-Quartermaster Corps (P)  
-Transport Service (P)izv. prof. dr. sc. **Robert Mikac**-Contemporary Military Concepts (P)  
-Crisis Management (P, A)prof. dr. sc. **Dragana Mutavdžić Pavlović**

-Contemporary Methods of Analysis and Establishing Chemical Compound Structure (P)

dr. sc. **Marinko Ogorec**

-Intelligence Analytics (P)

doc. dr. sc. **Tihomir Opetuk**



-Computer Simulations and Modelling (A)  
-Computer Simulations and Modelling D (L)  
-Operational Research (A)

mr. sc. **Marijan Paljević**



-Fundamentals of Branch and Service Employment (P, A)  
-Fundamentals of Strategy (S)

**Ružica Pavić-Kevrić**



-Quartermaster Corps (P, A)

doc. dr. sc. **Davorka Perić**



-Organization of the Health Care Service (P, S, A)

**Andrija Platužić**, dipl. ing.



-Fundamentals of Strategy (S)

**Daniel Pustički**, mag. ing. mech.



-Selection and Behaviour of Materials in Exploitation (A)

**Ivan Putnik**, bac.



-Computer Simulations and Modelling (A)  
-Computer Simulations and Modelling D (L)

izv. prof. dr. sc. **Žarko Rašić**



-Organization of the Health Care Service (P)

**Andrej Razumić**, mag. ing. mech.



-Military Systems and Processes Quality Management (A)

prof. dr. sc. **Biserka Runje**



-Military Systems and Processes Quality Management (P)

**Katarina Sabelja**, mag. ing. mech.



-Military Systems and Processes Quality Management (P, A)  
-Selection and Behaviour of Materials in Exploitation (A)

**Dubravko Sedmak**, struč. spec. ing. logist.



-Planning and Managing Defence Resources (S)

**Stipo Semren**, dipl.ing.polj.



-Training Management (P, A)

izv. prof. dr. sc. **Ratko Stanković**



-Transport Service (P)

**Damir Stručić**, dipl.krim.



-Homeland War (S)

**Krešimir Sudarić**, dipl.ing.polj.



-Command and Control (A)

dr. sc. **Lucija Svetina**



-Organization of the Health Care Service (P, S, A)

prof. dr. sc. **Željko Šitum**



-Mechatronics (P)

**Tina Štengl**, mag.oec.

-Planning and Managing Defence Resources (S)

doc. dr. sc. **Nataša Tošanović**

-Operational Research (P, A)

**Mladen Trnski**, dipl.pol.

-Security and Force Protection (A)

dr. sc. **Jadranko Tuta**

-Transport Service (P, A)

doc. dr. sc. **Mladen Viher**

-Fundamentals of Branch and Service Employment (P, A)

prof. dr. sc. **Neven Vrček**

-Fundamentals of Branch and Service Employment (P)

dr. sc. **Marin Vrkić**-Intelligence Analytics (P, A)  
-Security and Force Protection (P, A)doc. dr. sc. **Ante Vučemilović**-Contemporary CBRN Threats and Toxicological  
Consequences (P, S)doc. dr. sc. **Boris Zdilar**

-Organization of the Health Care Service (P, S, A)

dr. sc. **Slaven Zdilar**

-Fundamentals of Strategy (P, S)

prof. dr. sc. **Irena Žmak**

-Selection and Behaviour of Materials in Exploitation (P, A)

**Legend:**

- P Lectures
- S Seminar
- A Exercises
- L Laboratory exercises
- T Field exercises
- TJ Physical education excercises
- K Construction exercises
- PRJ Design exercises