



# COURSE CATALOGUE

## STUDY OF TRAFFIC LOGISTICS

University of Applied Sciences Hrvatsko zagorje Krapina

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**COURSE CATALOGUE**  
**STUDY OF TRAFFIC LOGISTICS**

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## Study Programme Traffic Logistics

<b>Study program</b>	Traffic Logistics
<b>Degree of education</b>	Three-year professional study
<b>Duration</b>	3 academic years (6 semesters)
<b>Mode of study</b>	Full-time study / Part-time study
<b>Professional title</b>	professional bachelor (baccalaureus / baccalaurea) transport logistics engineer [bacc. ing. traff. logist.]
<b>ECTS credits</b>	180
<b>Teaching hours</b>	The average weekly student workload is 22 to 23 school hours.
<b>Duration of the semester</b>	15 teaching weeks

### Purposefulness and goal of the study

In the Republic of Croatia, the demand for personnel in the field of logistics is increasing from year to year. The main goal of opening the professional study Transport Logistics VHZK is education at a higher level of logistics who can find their place in all professions of economy, especially transport, and public administration (army, police, customs). Based on interdisciplinary knowledge of the field of activity, final students would be able to lead, manage and coordinate at the tactical and strategic level of the organization in which they work or will work. Their activities would be focused primarily on solving logistics problems, both in logistics companies and in other companies where there is a need for applied logistics (area of economic logistics, energy, health, human resources, information, etc.).

Logistics at the VHZK will be developed on the principles of a systematic approach. A systematic approach would be the foundation of information technology, mathematical modeling and sophisticated computer programs.

Logistics studies transport as its subsystem, ie transport as a subsystem of transport, acquisition and improvement of theoretical and practical knowledge from all areas of economics and entrepreneurship, performing activities in the field of marketing, logistics, transport, forwarding, insurance etc.

The curriculum of the VHZK is comparable to the curriculum of reputable foreign universities:

1. Logistik und Transportmanagement  
Fachhochschule des BFI Wien  
Wohlmutschtr. 22 , 1020 Wien  
Austria

2. Transport Engineering / Logistics  
Hochschule Bremerhaven

An der Karlstadt 8, 27568 Bremerhaven  
Germany

**Jobs for which the student is qualified after graduation:**

- for professional activities of independent establishment and management of small and medium transport companies, for successful involvement in activities related to certain business functions in large companies, and
- miscellaneous customs affairs
- organization and management of large warehouses and freight terminals
- performing activities in the field of traffic control through terminal use of spatial databases (Geographic Information System - GIS)
- performing work in freight forwarding and insurance
- research projects in interdisciplinary areas of logistics processes
- organization and management of services in car services, technical inspections, car dealerships
- making professional decisions using quantitative methods and modern technologies
- a variety of logistics operations in large and medium-sized systems
- organizing business logistics systems and the most demanding logistics operations
- use of information management systems
- cooperation with other systems
- acquiring the necessary knowledge of entrepreneurship
- further continuation of professional studies

**Knowledge and skills acquired upon completion of studies:**

- required knowledge of a foreign language for business communication in international logistics chains.
- basic knowledge of mathematics, physics, statistics, economics, information technology in business, traffic technology of individual transport branches.
- basics: entrepreneurship and management, freight forwarding, risk, insurance, business mathematics and statistics, investing and financing.
- master the skill of organizing, managing and maintaining logistics systems. Warehouse capacity management, superstructure in distribution logistics.
- master the skill of business communication.

## COMPULSORY COURSES

**Grading:** Acceptable (2) – 50; Good (3) – 70; Very Good (4) – 82; Excellent (5) – 93

## Physics (L066)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: I**

**Course objective:** Acquiring the ability to solve problem tasks by applying the available basic knowledge of mechanics, hydrostatics and hydrodynamics, heat, electromagnetism and optics.

**Learning outcomes:**

After taking this course, students will be able to:

1. Distinguish between basic and derived units of the international system of units of measurement,
2. Use prefixes and write the order of small and large values.
3. To connect the concepts of mass, weight, energy, power and work, as well as heat and temperature with the phenomena in the environment.
4. Model problem tasks in formal physical language, and present and argue the obtained solutions
5. Use Internet services to record physical laws that can solve the problem
6. Interpret and independently graphically represent the relations of physical quantities
7. Explain the nature of electrical and magnetic phenomena, and the light and operation of optical instruments

**Required reading:**

1. Kulišić, Petar: Mechanics and Heat, Školska knjiga, Zagreb, 1989.
2. Cindro, Nikola: Fizika 2, Electricity and Magnetism, Školska knjiga, Zagreb, 1988.
2. Henč-Bartolić, Višnja; Kulišić, Petar: Waves and Optics, Školska knjiga, Zagreb 2004.

**Language:** Croatian

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## Information technology in business (L068)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: I**

**Course objective:**

Acquisition of basic IT and information competencies of Bachelor of Transport Logistics Engineers. Getting to know the possibilities of applying IT in work and business. Training for effective communication and lifelong learning.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Identify, select and use PC hardware as needed
2. Handle files and folders in the operating system
3. Browse and browse the internet. Evaluate the information found. Communicate using IT
4. Prepare and design a business letter, and documents that students will create during their studies to avoid plagiarism
5. Create project documentation using software. Plan the resources and schedule of a smaller project
6. Apply presentation rules, design presentations and present to the audience

7. Work with spreadsheets, use formulas, functions and graphs

**Required reading:**

1. Osnove poslovne informatike, Pejić Bach, Mirjana; Spremić, Mario; Srića, Velimir; Vugec, Saša i ostali, Ekonomski fakultet, Zagreb, 2020

**Language:** Croatian

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## Passenger transport logistics (L091)

**ECTS:** 6

**Lectures:** 30

**Exercises:** 30

**Semester:** II

**Course objective:**

The course introduces students to the problems of passenger transport logistics and its role in the modern transport system. The main goal is to acquaint students with the basic concepts of passenger transport logistics as well as with the elements of the passenger transport system horizontally and vertically. It also introduces students to the basics of economic, organizational, technical, legal, market, security and development aspects of passenger transport, forms of economic organizations involved in providing passenger transport services, as well as the economic and social environment in which the passenger transport system operates. , as a subsystem of the transport system in a broader sense.

**Learning outcomes:**

After taking this course, the student will be able to:

1. recognize the laws of the phenomenon of population mobility in modern society and the impact of mobility on transport flows in passenger traffic
2. understand and distinguish organizational forms and technological phases in passenger transport
3. explain the principles of planning transport production in passenger transport
4. describe and explain the basics of fleet management in a passenger transport company
5. identify elements for calculating the prices of transport services in passenger transport
6. explain the legal regulations in passenger transport logistics
7. describe and explain the safety, environmental and development aspects of the functioning of passenger transport logistics
8. Explain the meaning of human resource management.

**Required reading:**

1. Štefančić, G.: Tehnologija gradskog prometa I, Fakultet prometnih znanosti Sveučilišta u Zagrebu, Zagreb, 2008.

2. Brčić D., Ševrović M.: Logistika prijevoza putnika, , Fakultet prometnih znanosti Sveučilišta u Zagrebu, Zagreb, 2012.

**Language:** Croatian

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## Freight transport logistics and warehousing (L089)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: IV**

**Course objective:** To acquaint students with the elements and structure of freight transport logistics and division by branches of transport. Master the technique of planning transport routes and transport networks. Introduce students to logistics management systems with modern transport technologies. Division of means of transport by technologies, technical - technological characteristics of means of transport. Introduction to methods and techniques of strategy development and planning of cargo transport and storage development. Students acquire knowledge related to warehousing, warehouse division. Introduce students to warehouse management systems by introducing WMS (Warehouse Management Systems) into business. Gain knowledge and understanding of intermodality, intermodal terminals and intermodal technologies. Get acquainted with logistics and distribution centers, the processes of determining the location of logistics and distribution hubs.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Analyze the elements and structure of transport logistics
2. Apply the introduction and use of modern means and technologies of transport
3. Develop a strategy and operational plans for transport in the transport network
4. Apply drive unit management models in the transport company, LDC and warehouse
5. Develop a system for monitoring the quality of transport and logistics services and the application of modern means of information and communication technologies
6. Organize warehousing and warehousing operations using the WMS system

**Required reading:**

1. Ivaković, Č., Presečki, M., : Autorizirana predavanja i prezentacije
2. Ivaković, Č., Stanković, R., Šafran, M.,: Špedicija i logistički procesi, ISBN 978-953-243-038-7, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2010,
3. Rogić, K., Stanković, R., Šafran, M.,: Upravljanje logističkim sustavima, Veleučilište Velika Gorica, 2012..

**Language:** Croatian

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## Mathematics I (L065)

**ECTS: 7**

**Lectures: 45**

**Exercises: 45**

**Semester: I**

**Course objective:**

Acquisition of basic knowledge of vector algebra and mathematical analysis

**Learning outcomes:**

After taking this course, students will be able to:

1. Apply mathematically clear and unambiguous language in oral and written expression, and communication with others

2. Independent mathematical reasoning with logical, critical and creative thinking
3. Solve problem situations by analyzing possible strategies and choosing the right strategy
4. Present and argue the obtained solutions to problem tasks
5. Distinguish basic mathematical representations and visualize problems with sketches and drawings.
6. Search the Internet for the purpose of searching for definitions of terms and theorems applicable in problem solving.

**Literature:**

1. Marušić, Sanja.: Matematika 1, Fakultet prometnih znanosti, Zagreb, 2003

**Language:** Croatian

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## Mathematics II (L115)

**ECTS:** 6

**Lectures:** 30

**Exercises:** 45

**Semester:** I

**Course objective:**

Acquisition of basic knowledge of matrices and linear systems, series, partial derivatives, multiple integrations and differential equations. Apply mathematical laws of inference in the evidence processes of business and private environment.

**Learning outcomes:**

After taking this course, students will be able to:

1. Apply mathematical principles from five different domains of higher mathematics in everyday life and work environment.
2. Mathematically think about and sketch space: direction, plane and surface, and algebraically write down the relations between them.
3. Communicate in mathematical language as the basis of unambiguous communication on a personal and business level.
4. Use appropriate aids such as a smartphone, tablet, or laptop appropriately.
5. Use rows to compute irrational and transcendent functions to basic arithmetic operations

**Required reading:**

1. Fratrović, T., Ivanković, B., Rupčić, D., Rupčić, J.: Matematika 2, Fakultet prometnih znanosti, Zagreb, 2010.

**Language:** Croatian

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## Materials in transport (L077)

**ECTS:** 5

**Lectures:** 30

**Seminars:** 15

**Semester:** IV

**Course objective:**

Acquiring knowledge and skills for independent professional work in procedures with different materials and based on knowledge of their properties to apply the methods and conditions of transport and storage.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Know and determine the characteristic properties of materials of different shapes
2. Know the general technological procedures for obtaining materials of all forms
3. Based on the characteristic properties of the material will be able to choose transport technologies.
4. Select the optimal conditions of material transport in order to prevent material spoilage.
5. Apply national and international standards and technical conditions of transport which regulate the conditions of trade in non-hazardous and dangerous materials.

**Required reading:**

- 1.N. Štrumberger, Tehnologija materijala I., FPZ, Zagreb, 2005.
- 2.N. Štrumberger, Tehnologija materijala II., FPZ, Zagreb, 2003.

**Language:** Croatian

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## Methodology of writing professional and scientific papers (L138)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: V**

**Course objective:**

Acquiring knowledge of the methodology of writing professional and scientific papers.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Apply the basics of scientific knowledge for quality management
2. Through knowledge of the types of professional and scientific works, they will define their characteristics and classify them
3. Apply logic, methods, methodology and methodology in professional and scientific research
4. Model the knowledge on the conducted research in order to acquire planning and management skills in operational management
5. Will be able to determine the correct composition of writing professional and scientific papers
6. Use the achievements of information technology for strategic logistics process management

**Required reading:**

1. Zelenika, R.: Metodologija i tehnologija izrade znanstvenog i stručnog rada, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 1998.
2. Žugaj, M.: Metodologija znanstvenoistraživačkog rada, Fakultet organizacije i informatike Sveučilišta u Zagrebu, Varaždin 1997.

**Language:** Croatian

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## Fundamentals of intelligent transport systems (L113)

**ECTS:** 5

**Lectures:** 30

**Seminars:** 30

**Semester:** III

### **Course objective:**

Aim of the course: 1. To acquaint students with the basic features of intelligent transport systems, their application in solving problems of traffic and transport, the current state of introduction in Europe, the Republic of Croatia and others. 2. Enable knowledge transfer and skills development to define requirements for the design of intelligent transport systems, their installation, use and maintenance throughout the life cycle. 3. To enable students to participate in projects for the development, implementation and maintenance of various applications and services of intelligent transport systems.

### **Learning outcomes:**

After taking this course, the student will be able to:

1. define user requirements that are placed on ITS applications and services
2. describe and explain the installation of ITS systems
3. describe and explain the use and maintenance of the ITS system throughout the life cycle
4. explain the elements (monitoring phases) of strategic, technological and business development in the field of intelligent transport systems
5. apply the acquired knowledge and skills to self-understanding and solving related problems related to the design, operation, maintenance and application of intelligent transport systems services, as well as to their own independent professional development
6. understand the application of ITS technologies

### **Required reading:**

1. ETSI. (2017). Automotive Intelligent Transport System. Dostupno na: <http://bit.ly/2kdKluS>
2. Filić, M. (2017). Analiza postupaka procjene položaja temeljem zadanih pseudoudaljenosti u programski određenom prijamniku za satelitsku navigaciju (diplomski rad). Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu. Zagreb, RH.  
Available on: <https://repozitorij.pmf.unizg.hr/islandora/object/pmf:3230>
3. Hediger, M. (2020). MAT183 R-Leistungkurs: Theory and Applications. University of Zurich. Zurich, Switzerland.  
Available at <https://bit.ly/3iyR6x>
4. Lansley, G, and Cheshire, J. (2016). An Introduction to Spatial Data Analysis and Visualisation in R. University College of London (UCL). London. UK.  
Available at /Available at: <https://bit.ly/3iDDGIL>
5. Khalel, A M H. (2010). Position Location Techniques in Wireless Communication Systems (MSc thesis). Blekinge Institute of Technology. Karlskrona, Sweden.  
Available at: <http://bit.ly/2vIBGd3>

**Language:** Croatian

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## Fundamentals of logistics systems (L116)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: I**

**Cilj predmeta:**

Stjecanje znanja iz osnova logističkih sustava.

**Ishodi učenja:**

Student će nakon polaganja ovog predmeta moći:

1. Organizirati radne procese uz pomoć osnova logističkih sustava
2. Upravljati prometnim procesima u cestovnom prometu
3. Optimizirati prometne procese kroz optimalan izbor prijevoznog sredstva i itinerera
4. Na osnovu logističkih sustava pratiti troškove eksploatacije
5. Kroz logističke sustave primjenjivati metode za osiguranje kvalitete
6. Utjecaj primjene logističkih sustava na poslovne rezultate

**Obvezna literatura:**

1. Bazijanac, E.: Tehnička eksploatacija i održavanje zrakoplova, Fakultet prometnih znanosti Sveučilišta u Zagrebu, Zagreb, 2007.
2. Georgijević, M.: Tehnička logistika, Educatio biblioteka,
3. Teodorović, D.: Transportne mreže, Saobraćajni fakultet Univerziteta u Beogradu, Beograd, 2007.
4. Vujnović, N.: Teorija pouzdanosti tehničkih sustava, Vojno – izdavački novinski centar, Beograd, 1987

**Language:** Croatian

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## Basics of logistics (L086)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: II**

**Course objective:**

Educate and teach students the basic concepts of logistics sciences, and logistics functions and processes. To acquaint students with the effectiveness and efficiency of logistics processes, stocks, logistics resources, warehousing, transport, transport and transportation, as well as distribution and maintenance system in the function of integrated logistics. By listening to and mastering the course through lectures, exercises and seminar work, students are trained for possible design and optimization of logistics processes.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Explain and define basic logistical concepts

2. Demonstrate organizational skills and planning skills of logistics distribution processes
3. Explain the differences between the relationship between distribution and logistics
4. Distinguish business logistics methods
5. Independently analyze the maintenance system through the quality of logistical support
6. Independently analyze the processes and activities of integrated logistics management
7. Critically assess the advantages and disadvantages of individual branches of transport in the process of integrated logistics
8. Familiarize yourself with the inventory management process
9. Independently analyze the costs of distribution, storage and transport
10. Describe the processes of the flow of delivery, processing, preparation, dispatch and delivery of goods
11. Describe the differences between products and services

**Required reading:**

1. D.S. Bloomberg, LeMay S., Hanna J.B.: "Logistika", Mate d.o.o., Zagreb, 2006.
2. J. Šamanović : "Logistički i distribucijski sustavi", Split, 1999. Z. Aržek, I. Andrijanić, D. Prebežac, R. Zelenika: Transportno i špeditersko poslovanje, Zagreb 1998.
3. R. Zelenika, : "Prometni sustavi – tehnologija, organizacija, ekonomika, logistika, menadžment", Rijeka, 2001., M. Šafran, R. Stanković: Tehnika špedicije – vježbe, FPZ 2002., 2001.
4. V. Ferišak, I. Medvešek: "Poslovna logistika", Zagreb, 1983.
5. M. Barković, B. Škoti, R. Spudić, „Vojna logistika“, Veleučilište Velika Gorica, 2015..
6. Autorizirana predavanja

**Language:** Croatian

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## Basics of entrepreneurship and management (L075)

**ECTS:** 6

**Lectures:** 30

**Exercises:** 30

**Semester:** V

**Course objective:**

The aim of the course is to acquaint students with the basic concepts, laws and problems entrepreneurship and an introduction to the basic concepts of management. The course enables the acquisition of knowledge and skills in the field of management and entrepreneurship, so that they can independently participate directly in planning, initiating, financing, organizing, leading, developing and controlling an entrepreneurial project.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Explain the basic determinants of entrepreneurship, describe the concept and meaning of entrepreneurs, entrepreneurship.
2. Identify the legal forms of establishing an entrepreneurial enterprise and compare the start-up of an entrepreneurial enterprise with regard to different legal forms of establishment
3. Distinguish types of investment and financing of entrepreneurial venture

4. Identify elements of business planning
5. Describe the concept of management and managers, Explain the difference between entrepreneurship and management and entrepreneurs and managers.
6. Distinguish, describe, identify, interpret and analyze core functions (planning, organizing, leading, human resource management and control), and management roles
7. Develop and analyze the obtained results of the business plan, distinguish and link the financial and non-financial parts of the business plan, Calculate and explain the meaning of indicators used to assess the effectiveness of investment
8. Demonstrate presentation, teamwork and creativity skills in creating a business plan

**Required reading:**

1. Belak, V.: Menadžment u teoriji i praksi. Biblioteka Excellens, Zagreb, 2014.
2. Buble, M.: Osnove menadžmenta, Sinergija, Zagreb, 2006.
3. Sikavica, P., Bahtijarević-Šiber, F., Pološki Vokić, N.: Temelji menadžmenta. Školska knjiga, Zagreb, 2008
4. Škrtić, M.: Poduzetništvo, Sinergija nakladništvo, Zagreb, 2006.

**Language:** Croatian

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## Fundamentals of water transport technology (L097)

**ECTS: 4**

**Lectures: 30**

**Exercises: 15**

**Seminars: 15**

**Semester: III**

**Course objective:**

Educate students on the basic concepts of water transport, and acquire knowledge related to the organization and process of transport logistics, transport capacities of river and sea ports, water transport system, world maritime trade, water transport infrastructure and get acquainted with the model of transshipment machinery.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Explain the basic concepts in water transport
2. Know the elements of the marine water system, infrastructure and transshipment process
3. Independently present and explain the processes in; water transport, in the transshipment technology system, explain the planning model
4. Explain the elements of water transport infrastructure and vessels.
5. Know the basics of legislation related to water transport
6. Explain the process of navigation, loading and unloading of cargo

**Required reading:**

1. Prezentacije za nastavu (VHZK Edunet/Merlin MS Teams).
2. Rogić, K.: Plovni sastavi i oprema brodova, Fakultet prometnih znanosti, Zagreb, 2008.
3. Jolić, N.: Osnove tehnologije vodnog prometa - autorizirana predavanja, Fakultet prometnih

znanosti, Zagreb, 2013

4. Rožić, T.: Osnove tehnologije vodnog prometa - vježbe, Fakultet prometnih znanosti, Zagreb, 2013.

**Language:** Croatian

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## Fundamentals of air traffic technology (L087)

**ECTS: 4**

**Lectures: 30**

**Exercises: 15**

**Semester: III**

**Course objective:**

Acquisition of basic knowledge in the field of air traffic technology, aircraft reception and departure technology, airport infrastructure, air traffic control, air safety and protection, aviation accident research.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Explain the basic concepts of air transport
2. Know the aerodynamic forces present on the aircraft
3. Independently present the principle of operation of the aircraft and its construction
4. Explain the elements of airport infrastructure
5. Know the process of acceptance and departure in air traffic and elements of safety and security in air traffic
6. Know the basics of international and domestic legislation in the air transport system

**Required reading:**

1. Radačić Ž., Suić I.,: Tehnologija zračnog prometa, Fakultet prometnih znanosti, Zagreb, 1992
2. Andrijanić I., Aržek Z., Prebežac D., Zelenika R.: Transportno i špeditersko poslovanje, Nikrorad, Zagreb, 2001

**Language:** Croatian

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## Business communication (L090)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: V**

**Course objective:**

Acquiring the basic knowledge and skills needed to communicate in the workplace.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Give an independent speech and oral presentation



2. Conduct business meetings and negotiate
3. Introduce yourself to the employer
4. Explain communication models
5. Manage communication in a business environment

**Required reading:**

1. Plenković, M: Poslovna komunikologija: Kultura poslovnog komuniciranja, HKD & Nonacom, Zagreb, 2003.
2. Bebek, B., Kolumbić, A., Poslovna etika, Sinergija, Zagreb, 2003.
3. Marković, M: Poslovna komunikacija, Clio & HKD, Zagreb, 2005.
4. Bovee, C.L., Thill, J.V. Suvremena poslovna komunikacija, Mate, Zagreb, 2012.

**Language:** Croatian

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## Business English II (L084)

**ECTS: 3**

**Lectures: 15**

**Exercises: 30**

**Semester: II**

**Course objective:**

Developing basic language skills, with an emphasis on the language of the profession; training students for independent written and oral expression in interactive situations in the context of the profession; developing basic language skills, with an emphasis on the language of the profession; training students for oral and written business communication; training students to self-present themselves / companies in English. encouraging the independent use of professional literature in English and training for logical structuring of facts with the use of information technology (presentations in English related to professional topics).

**Learning outcomes:**

After taking this course, students will be able to:

1. recognize the sociolinguistic context of the language of the profession
2. conduct a more advanced level of analysis of language structures within the language of the profession
3. communicate orally and in writing independently in English
4. independently use professional literature, use professional terminology and grammatical structures in the context of the language of the profession; raising the level of acquisition of basic language skills, in the context of the language of the profession
5. assess the quality of English language content on the Internet

**Required reading:**

Lecture materials (published on the course website) composed of texts taken from contemporary professional and methodological literature. **Language:** English

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## Business English I (L078)

**ECTS: 3**

**Lectures: 15**

**Exercises: 30**

**Semester: I**

**Course objective:**

Developing basic language skills, with an emphasis on the language of the profession; training students for independent written and oral expression in interactive situations in the context of the profession; training students to understand the functioning of English verb tenses; understanding the occurrence of forms of interference between English and Croatian and understanding their causes, especially in the field of professional language; gaining insight into the facts related to the standardization of terminology in the field of profession; understanding the morphological features of terminology in the field of profession; understanding the creativity of terminology in the field of profession; developing the ability to assess the language quality of Internet content; training to assess the quality of translations created using machine translation programs; encouraging the independent use of professional literature in English and training for logical structuring of facts with the use of information technology (presentations in English related to professional topics).

**Learning outcomes:**

After taking this course, students will be able to:

1. recognize the sociolinguistic context of the language of the profession
2. conduct a more advanced level of analysis of language structures within the language of the profession
3. communicate orally and in writing independently in English
4. independently use professional literature, use professional terminology and grammatical structures in the context of the language of the profession; raising the level of acquisition of basic language skills, in the context of the language of the profession
5. assess the quality of English language content on the Internet

**Required reading:**

Lecture materials (published on the course website) and adapted texts taken from contemporary professional and methodological literature.

**Language:** English

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## Business German I (L079)

**ECTS: 3**

**Lectures: 15**

**Exercises: 30**

**Semester: I**

**Course objective:**

Developing language skills in the context of the profession (transport logistics) and the business environment. Systematization and deepening of knowledge in the general language field and language laws; optimizing language skills: listening comprehension, reading comprehension, writing and

speaking (independent presentation or interaction); training students for written and oral communication in German with native speakers; intercultural sensitization and promotion of tolerance (distinguishing established stereotypes from intercultural peculiarities). Acquisition of competencies that enable successful translation of simpler original professional texts (independent use of dictionaries and other manuals (classic as well as mediated by electronic media).

**Learning outcomes:**

After taking this course, the student will be able to:

1. conduct basic oral and written communication (use basic phrases when meeting, describing individual family members and activities during the day in the family and at work, help foreigners find their way, communicate in the restaurant and hotel reception, understand job advertisements and react to them)
2. write short business letters, notes and messages (use regular phrases to start and end letters, compose a short message),
3. understand and translate simple professional texts,
4. integrate known linguistic laws into a new simple context,
5. recognize the similarities and differences of the language structures of the mother tongue and foreign language.

**Required reading:**

1. Selection of texts for students of transport logistics at VHZK (internal script in electronic form, prepared by A. Puović, prof.) - Texts (Verkehrslogistik I)
2. Basics of grammar with exercises (internal script in electronic form, prepared by A. Puović, prof.) - Grundrisse der Grammatik mit Übungen

**Language:** German

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## Business German II (L085)

**ECTS:** 3

**Lectures:** 15

**Exercises:** 30

**Semester:** I

**Course objective:**

Developing language skills in the context of the profession (transport logistics) and the business environment. Systematization and deepening of knowledge in the general language field and language laws; improving skills: listening comprehension, reading comprehension, writing and speaking (independent

exposures or interactions); training students for written and oral communication in German with native speakers; intercultural sensitization and promotion of tolerance (distinguishing established stereotypes from intercultural peculiarities). Acquisition of competencies that enable successful translation of original professional texts (independent use of dictionaries and other manuals: classic as well as mediated by electronic media).

**Learning outcomes:**

After taking this course, the student will be able to:

1. to conduct basic oral and written communication (about the study, about your obligations at work; to conduct simple telephone conversations; to communicate with business partners at fairs and professional gatherings),

2. write short business letters, notes and messages (use basic phrases characteristic of business correspondence, compose letters according to available standard forms),
3. understand and translate simple professional texts,
4. integrate known linguistic laws into a new simple context,
5. use terms of the language of the profession,
6. recognize the similarities and differences of language structures of the mother tongue and foreign language.

**Required reading:**

1. Selection of texts for students of transport logistics at VHZK (internal script in electronic form, prepared by A. Puović, prof.) - Texts (Verkehrslogistik)
2. Basics of grammar with exercises (internal script in electronic form, prepared by A. Puović, prof.) - Grundrisse der Grammatik mit Übungen

**Language:** German

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## Transshipment machinery (L114)

**ECTS:** 6

**Lectures:** 30

**Seminars:** 30

**Semester:** IV

**Course objective:**

Acquiring knowledge and information necessary to understand the role and importance of transshipment means in the traffic process. Introducing students to the basic technical and technological characteristics, methods of calculation and selection of means of transshipment machinery and their application in the handling of various types of goods and materials.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Define places, roles and operational characteristics of transshipment machinery
2. Determine the physical and technical characteristics of the goods that affect the choice of transshipment means
3. Explain the division of the conveyor, the principle of operation, the basic forms and elements of construction, areas of application and advantages and disadvantages
4. Recognize the basic technical and operational characteristics of transshipment facilities with continuous and intermittent action and apply them to solve specific transshipment tasks
5. Explain the use of robots in transshipment, list the components of the robot

**Required reading:**

1. Mavrin I.: Transporteri, Fakultet prometnih znanosti u Zagrebu, Zagreb, 1999.
2. Dundović Č.: Prekrcajna sredstva prekidnog transporta, Pomorski fakultet Sveučilišta u Rijeci, Rijeka, 2005
3. Jurić I.: Prekrcajna mehanizacija-zadaci, nastavni materijal, Fakultet prometnih znanosti u Zagrebu

**Language:** Croatian

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## Traffic infrastructure (L088)

**ECTS: 6**

**Lectures: 30**

**Exercises: 15**

**Semester: IV**

**Course objective:**

Students successfully master the course material, from the traffic aspect, gain the ability to understand and participate in the process of planning, designing and building transport infrastructure.

**Learning outcomes:**

After completing and passing this course, the student will be able to:

1. Understand the basic concepts in the field of transport and spatial planning and construction regulations in the field of transport infrastructure construction
2. Analyze and evaluate the importance of course content with an emphasis on road traffic
- 3 Describe and sketch the basic design elements of transport infrastructure
4. Recognize and analyze content through interconnectedness in practice
5. Understand the use of new technologies in the study of course content
6. Participate in discussions related to the presentation or presentation, demonstrate communication skills and responsibilities in teamwork.

**Required reading:**

1. Božičević, J. i Legac, I.: Cestovne prometnice, Zagreb, 2001.
2. Legac, I.: Cestovne prometnice I, Fakultet prometnih znanosti, Zagreb, 2006
3. Pavlin, S.: Aerodromi I, Fakultet prometnih znanosti, Zagreb, 2006.
4. Stipetić, A.: Gornji ustroj željezničkoga kolosijeka, Fakultet prometnih znanosti, Zagreb, 2008.

**Language:** Croatian

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## Traffic law (L074)

**ECTS: 4**

**Lectures: 30**

**Exercises: 15**

**Semester: III**

**Course objective:**

Acquiring knowledge of students from almost all areas of Traffic Law, so that, after graduation, they can independently participate in the implementation of part of the traffic technology process.

**Learning outcomes:**

After taking this course, the student will be able to:

1. apply the basic elements of traffic law and its application in the organization of the traffic process;
2. analyze and evaluate traffic as a complex dynamic system with a large number of elements of internal structure (technical, technological, organizational, economic and legal subsystem). The legal

subsystem provides a legal framework for the proper functioning of other subsystems application should be known to students in this study program;

3. understand the basic concepts and theoretical approaches of traffic law with an emphasis on the field of road and basic knowledge in the field of air, rail and inland navigation law;

4. analyze and monitor legal regulations in the field of transport;

5. describe and apply the elements of the legal subsystem in relation to other subsystems of transport.

**Required reading:**

1. S. Kaštela; L. Horvat: Prometno pravo, Školska knjiga, Fakultet prometnih znanosti, Zagreb, 2008.

2. I. Grabovac; S. Kaštela: Međunarodni i nacionalni izvori prometnog prava, Zagreb, HAZU, Književni krug Split, Zagreb-Split, 2013.

**Language:** Croatian

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## Management and organization of a transport company (L073)

**ECTS:** 5

**Lectures:** 30

**Exercises:** 15

**Semester:** IV

**Course objective:**

The course introduces students to the problems of conceptual definition of a transport company, its organization and management. Through the course material, students get acquainted with the concept of organization and organization, factors of organization and organization, business processes and functions that take place in transport companies, the concept and elements of organizational structure, basics of management of transport companies as economic organizations and organizational culture and business ethics. opportunities for the development of the organization of transport companies in the future.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Define the term transport company
2. Analyze the problem of running and managing a transport company
3. Explain the basic forms of organizational structures of the transport company
4. Explain the business functions of a transport company
5. State the basic principles and principles of managing a transport company
6. Explain the importance of managerial functions for the overall functioning of transport companies

**Required reading:**

1. Žugaj M., Šehanović J., Cingula M.: Organizacija, Fakultet organizacije i informatike, Varaždin 1999.

2. Buble M., Management, Ekonomski fakultet Split, Split, 1993.

3. Sikavica P., Bahijarević-Šiber F., Pološki-Vokić N., Temelji menadžmenta, Školska knjiga, Zagreb, 2008.

4. Sikavica P., Bahijarević-Šiber F., Pološki-Vokić N., Suvremeni menadžment, Školska knjiga, Zagreb, 2008.

5. Sikavica P.: „Organizacija”, Školska knjiga, Zagreb, 2011.

## 6. Autorizirana predavanja

**Language:** Croatian

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## Shipping, risk and insurance (L083)

**ECTS:** 5

**Lectures:** 30

**Exercises:** 30

**Semester:** III

**Course objective:**

Educate and teach students the basic concepts of freight forwarding business, and the acquisition of knowledge related to the organization and processes in transport, storage, and techniques and methods of communication with various entities in the implementation of freight forwarding business. By listening to and mastering the course through lectures and exercises, students are trained for freight forwarding business, as well as freight forwarding techniques in the economic system.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Explain and define the basic concepts of traffic through history.
2. Explain and define basic freight forwarding terms.
3. Describe the processes of freight forwarding business, as well as the techniques of freight forwarding business in the economic system of the Republic of Croatia.
4. Describe the processes of processing, preparation and dispatch of goods in special operations of freight forwarders.
5. List international trade rules.
6. Describe the system of freight forwarding business.
7. Independently analyze transport insurance and co-insurance and reinsurance procedures.
8. Critically evaluate the advantages and disadvantages of freight forwarding and logistics
9. List and describe customs operations and responsibilities of freight forwarding

**Required reading:**

1. R. Zelenika: Međunarodna špedicija, Rijeka 2006.
2. M. Šafran, R. Stanković: Tehnika špedicije – vježbe, FPZ 2002.
3. Andrijanić I., Aržek Z. Prebežac D., Zelenika R., Transportno i špeditersko poslovanje, Nikrorad, Zagreb, 2001.
4. Hrvatski časopis za osiguranje, Hrvatsku ured za osiguranje, Zagreb, 2020.

**Language:** Croatian

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## Supply chain management (SCM ) (L117)

**ECTS:** 6

**Lectures:** 30

**Exercises:** 30

**Semester: V****Course objective:**

Introduction to the concept and structure of supply chains and their importance in modern economic systems. Introduce students to the parts and elements of supply chains, as well as strategies for interconnecting stakeholders in the operation of the supply chain. An important component of this course is in getting to know and acquiring knowledge about networks, distribution and transport, management models, planning and capacities in the transport network and supply chain. Students acquire knowledge related to strategic management in supply chains, information systems and technologies and E-business. They also gain knowledge on the analysis of processes that take place in the supply chain and individual parts of the supply chain.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Understand the structure and elements in supply chain management
2. Construct a supply or transport network and critically evaluate changes in the network by adding or subtracting elements.
3. Apply knowledge of strategic management of supply chain planning and management (SCM)
4. Analyze the structure of networks, how we design them in the structure of distribution, transport with other stakeholders in the realization of business.
5. Define the role of transport, select carriers, design options and capacities in the transport network and plan routes.
6. Recognize the importance and role of information and communication systems in the operation of the supply chain.

**Required reading:**

1. Ivaković, Č., Presečki, M.: Autorizirana predavanja i prezentacije
2. Ivaković, Č., Stanković, R., Šafran, M.: Špedicija i logistički procesi, ISBN 978-953-243-038-7, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2010, sveučilišni udžbenik
3. Rogić, K., Stanković, R., Šafran, M.: Upravljanje logističkim sustavima, Veleučilište Velika gorica, 2012.

**Language:** Croatian

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## Probability and statistics (L076)

**ECTS: 7**

**Lectures: 45**

**Exercises: 30**

**Semester: 3**

**Course objective:**

Get acquainted with the basic concepts of combinatorics and probability theory as well as statistical methods used in quantitative analyzes of traffic engineering and economics.

**Learning outcomes:**

After taking this course, the student will be able to:

1. Apply concepts from combinatorics and probability theory in concrete random experiments.
2. Recognize the distribution of a random variable and know its most important properties.
3. Use theoretical laws to draw conclusions about the probability of an event.



4. To determine the statistical set, its characteristics and their modalities for each observed statistical survey, and to calculate and interpret the numerical characteristics of the characteristics.
5. Test statistical hypotheses on the parameters of the distribution in the basic set.
6. Determine the equation of the linear regression model for features, interpret its parameters and what predictions of feature values can be obtained.

**Required reading:**

1. Nastavni materijali (Merlin).
2. M. Benšić, N. Šuvak – Uvod u vjerojatnost i statistiku. Izdavač: Sveučilište J.J. Strossmayera, Odjel za matematiku, 2014.

dostupno online: link: [https://www.mathos.unios.hr/uvis/UVIS\\_knjiga\\_final/UVIS\\_knjiga\\_web.pdf](https://www.mathos.unios.hr/uvis/UVIS_knjiga_final/UVIS_knjiga_web.pdf)

3. Dumičić, K. i dr., Poslovna statistika, EFZG, Element, 2011.

**Language:** Croatian

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## Apprenticeship (L120)

**ECTS: 6**

**Lectures: 0**

**Exercises: 150**

**Semester: 5**

**Course objective:**

Acquiring practical knowledge on planning, organization and implementation of logistics, shipping and other related tasks.

**Learning outcomes:**

1. After taking this course, the student will be able to:
2. Analyze theoretical knowledge with the labor market.
3. Describe business processes.
4. Compare academic knowledge with real business situations
5. Analyze business skills through work.
6. Argue the requirements of the program and develop self-confidence.

**Required reading:**

1. Apprenticeship rulebook
2. Apprenticeship instructions

dostupno online: link: [https://www.mathos.unios.hr/uvis/UVIS\\_knjiga\\_final/UVIS\\_knjiga\\_web.pdf](https://www.mathos.unios.hr/uvis/UVIS_knjiga_final/UVIS_knjiga_web.pdf)

3. Apprenticeship journal

**Language:** Croatian, English

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## Physical education (L070/L129/L130/L131)

**ECTS: 1**

**Lectures: 0**

**Exercises: 30**

**Semester: 1-4****Course objective:**

The aim of the Physical and Health Culture subject is, in addition to raising awareness of the importance of physical and health culture, preserving already acquired and acquiring new motor knowledge and skills in order to influence anthropological characteristics (motoric characteristics, functional, cognitive and conative abilities) and improve health and working abilities, satisfying the need for movement, training students for rational, meaningful use and spending of free time, and support for a quality life in youth, maturity and old age.

**Learning outcomes:**

1. Apply several warm-up exercises for a particular kinesiological activity
2. Show the basic elements of a particular kinesiology activity
3. Explain some basic rules of certain kinesiological activities
4. Demonstrate the correct execution of some new elements of a particular kinesiological activity
5. Apply some stretching exercises for a particular kinesiological activity
6. Repeat the given new elements of individual kinesiology activities in series
7. Design an exercise for the purpose of actively spending your free time
8. Recognize some musculoskeletal disorders and exercises for their prevention
9. Explain the basics of the impact of regular exercise on health
10. Create the introductory and final part of the lesson (training).

**Required reading:**

1. Zbornici radova ljetnih škola kineziologa RH. Dostupno na: <http://www.hrks.hr/zbornici.htm>
2. Tempus projekt Education for Equal Opportunities at Croatian Universities. Dostupno na : <http://www.eduquality-hr.com/>
3. Neljak, B., Caput-Jogunica, R. (2012). Kineziološka metodika u visokom obrazovanju. Zagreb: Kineziološki fakultet Sveučilišta u Zagrebu.
4. Kulier, I. (2010). Zbogom debljino – strategija mršavljenja. Knjiga. Zagreb. V.B.Z. d.o.o.
5. Moore, A. (2010). Standardni plesovi. Zagreb: Znanje.
6. Milanović, D. (2009). Teorija i metodika treninga. Zagreb: Kineziološki fakultet Sveučilišta u Zagrebu.
7. Klavara, P. (2009). Introduction to kinesiology: a biophysical perspective. Toronto: Sport Books Publisher.
8. Mišigoj-Duraković, M. (2008). Kinantropologija – biološki aspekti tjelesnog vježbanja. Zagreb: Kineziološki fakultet Sveučilišta u Zagrebu.
9. Škof, B. (2007). Šport po meri otrok in mladostnikov. Ljubljana: Univerza v Ljubljani, Fakulteta za šport.
10. Jukić, I., Marković, G. (2005). Kondicijske vježbe s utezima. Zagreb. Kineziološki fakultet Sveučilišta u Zagrebu.
11. Prskalo, I. (2004.) Osnove kineziologije, udžbenik za studente učiteljskih škola. Petrinja: Visoka učiteljska škola.
12. Sertić, H. (2004). Osnove borilačkih sportova, Zagreb. Kineziološki fakultet.
13. Janković, V., N. Marelić (2003) Odbojka za sve, Zagreb: Autorska naklada.
14. Kulier, I. (2001). Što jedemo. Zagreb: Impress.
15. Anderson, B. (2001). Stretching. Zagreb: Gopal.
16. Čorak, N. (2001). Fitness Bodybuilding. Zagreb: Hinus.
17. Klinika za dječje bolesti Zagreb, Služba za reproduktivno zdravlje (2001). Kontracepcija - vodič kroz metode i sredstva za spriječavanje trudnoće, Zagreb.

18. Clark, N. (2000). Sportska prehrana. Zagreb: Gopal.
19. Mahešvarananda, P. M. (2000). Sustav joga u svakodnevnom životu. Ibera Verlag, Beč.
20. Klinika za dječje bolesti Zagreb, Služba za reproduktivno zdravlje (2000). Spolno prenosive bolesti, Reproductivno zdravlje, Metode i sredstva za zaštitu od trudnoće, Zagreb.
21. Mišigoj-Duraković, M. i sur. (1999). Tjelesno vježbanje i zdravlje. Zagreb: Fakultet za fizičku kulturu
22. Dick, F. W. (1997). Sports Training Principles. London. A C Black.

**Language:** Croatian, English

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## City traffic (L098)

**ECTS: 6**

**Lectures: 30**

**Exercises: 15**

**Semester: 5**

**Course objective:**

Acquiring practical knowledge on city traffic.

**Learning outcomes:**

1. Evaluate acquired knowledge in the organization of traffic in cities
2. Differentiate traffic processes, whether it is public city traffic, individual or freight traffic in cities.
3. Analyze city traffic by judging the advantages and disadvantages of the choice of means of transport, itineraries and the location of stops as well as the location of stations and terminals.
4. Solve exploitation costs through quality factors.
5. Show methods for ensuring the quality of city traffic as well as their impact on business results

**Required reading:**

1. Štefančić, G.: Tehnologija gradskog prometa I., Fakultet prometnih znanosti Sveučilišta u Zagrebu, Sveučilišni udžbenik, Zagreb, 2008.
2. Štefančić, G.: Tehnologija gradskog prometa II., Fakultet prometnih znanosti Sveučilišta u Zagrebu, Sveučilišni udžbenik, Zagreb, 2010.
3. Štefančić, G., Presečki, I., Križanović, S.: Autobusni kolodvori, Fakultet prometnih znanosti Sveučilišta u Zagrebu, Sveučilišni udžbenik, Zagreb, 2015.

**Language:** Croatian, English

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## Road traffic technology (L067)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: 2**

**Course objective:**

Acquiring practical knowledge on road traffic technology.

**Learning outcomes:**

1. Differentiate road and work traffic processes in road traffic
2. To optimize the road traffic process by judging the advantages and disadvantages of the choice of means of transport and itinerary.
3. To judge exploitation costs through quality factors
4. Argument quality assurance methods as well as their impact on business results.

**Required reading:**

1. Baričević, H.: Tehnologija kopnenog prometa, Pomorski fakultet Sveučilišta u Rijeci, Rijeka, 2001.
2. Evans, J.R.: Quality&Performance Excellence: Management, Organization and Strategy, 5E, Thomson South Western, Mason, OH, 2008.
3. Lazibat, T.: Upravljanje kvalitetom, Znanstvena knjiga, Zagreb, 2009.
4. Zelenika, R.: Prometni sustavi, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 2002.
5. Županović, I.: Tehnologija cestovnog prometa, Fakultet prometnih znanosti Sveučilišta u Zagreb, Zagreb, 2002.

**Language:** Croatian, English

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## Geospatial information systems (L133)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: 2**

**Course objective:**

1. To acquaint students with the procedures for collecting, storing, analyzing and graphically presenting spatial data and designing new information services and systems in transport and transport logistics.
2. Through problem analysis, develop students' ability to implement the appropriate procedure of gathering, analyzing and graphically presenting spatial data for the needs of development and maintenance of information services in traffic.
3. Train students to participate in projects of development, design, implementation and maintenance of various information services and systems based on geomatics.

**Learning outcomes:**

1. Understand the concept of spatial data, and the ways and procedures of their collection, storage, analysis and graphical representation
2. Check the architecture and functionalities of the geospatial information system (GIS)
3. Use, design and maintain services and systems based on the application of GIS
4. Argue the features and limitations of spatial data quality
5. Independently establish and use a geospatial information system for the purposes of collecting, storing, analyzing and graphically presenting spatial data in an open source environment for statistical computing R
6. Independently and objectively analyze spatial data and draw conclusions from the results of the analysis.

**Required reading:**

1. Frančula, N. (2004). Digitalna kartografija (3. prošireno izdanje). Sveučilište u Zagrebu, Geodetski fakultet. Zagreb, RH. Available at:  
[https://bib.irb.hr/datoteka/42334.Digitalna\\_kartografija\\_skripta.pdf](https://bib.irb.hr/datoteka/42334.Digitalna_kartografija_skripta.pdf)
2. Filić, M. (2017). Analiza postupaka procjene položaja temeljem zadanih pseudoudaljenosti u programski određenom prijamniku za satelitsku navigaciju (diplomski rad). Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu. Zagreb, RH. Available at:  
<https://repozitorij.pmf.unizg.hr/islandora/object/pmf:3230>
3. Hediger, M. (2020). MAT183 R-Leistungskurs: Theory and Applications. University of Zurich. Zurich, Switzerland. Available at: <https://bit.ly/3iyR6x>
4. Harris, R. (2013). An Introduction to Mapping and Spatial Modelling R. University of Bristol. Bristol, UK. Available at: [https://oerstatistics.files.wordpress.com/2016/03/intro\\_to\\_r.pdf](https://oerstatistics.files.wordpress.com/2016/03/intro_to_r.pdf)

**Language:** Croatian, English

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## Navigation of autonomous robots, aircraft and vehicles (L134)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: 2**

**Course objective:**

1. To acquaint students with the theoretical and practical basis of understanding problems and the development, establishment and operational use of autonomous robots, aircraft and vehicles for the needs of traffic logistics.
2. Through problem analysis, develop an analytical way of thinking and apply it to relevant scenarios of the use of autonomous robots, aircraft and vehicles in traffic and traffic logistics.
3. Train students to understand the problem, connect with the environment the expected scenario of controlled and autonomous aircraft and vehicles in traffic and traffic logistics.

**Learning outcomes:**

1. Interpret the requirements for the quality of navigation of autonomous robots in a given environment and field of application

2. Argument and explain the problem of navigation of an autonomous robot in a specific case of application and influential variables that determine the quality of navigation
3. Apply acquired knowledge and skills to the selection, development and operational application of navigation in individual cases of autonomous robots, aircraft and vehicles
4. Evaluate the offered commercial solutions from the point of view of the expected application in the technological and operational sense, using the success indicators discussed in class
5. Carry out independent and problem-oriented work in the programming environment for open source statistical computing R

**Required reading:**

1. Correll, N. (2016). Introduction to Autonomous Robots. Magellan Scientific. University of Colorado. Boulder, CO. Available at: <https://bit.ly/2BZitcB>
2. Rouaud, M. (2017). Probability, Statistics and Estimation: Propagation of Uncertainties in Experimental Measurements. Lulu.com. Available at: <http://www.incertitudes.fr/book.pdf>
3. Tirindelly, P. (2016). Sensor Fusion of Raw GPS Measurements for Autonomous Vehicle Localization. Universitat Politècnica de Catalunya. Barcelona, Spain. Available at: <https://bit.ly/3ht1olj>

**Language:** Croatian, English

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## Internet of Things (L134)

**ECTS: 6**

**Lectures: 30**

**Exercises: 30**

**Semester: 2**

**Course objective:**

1. To acquaint students with the architecture, elements, procedures and protocols and applications of the Internet of Things, as a symbiosis of communication, computer, IT and measurement technologies.
2. Through problem analysis, develop students' ability to independently implement problem analysis, review technologies, and design and implement technological and business solutions to problems in a given environment.
3. Train students to participate in projects of development, design, implementation and maintenance of various information services and systems based on the Internet of Things.

**Learning outcomes:**

1. Check the concept of IoT data, and the ways and procedures of its collection, storage, analysis and graphical representation
2. Verify the architecture and functionality of Internet of Things (IoT) IoT3 based systems and services. Use, design and maintain services and systems based on IoT applications
4. Argument the characteristics and limitations of services and systems based on the application of IoT
5. Act independently and objectively in projects of development, design, implementation and maintenance of various information services and systems based on the Internet of Things

**Required reading:**

1. Iqbal, M A, Hussain, S, Xing, H, Imran, M A. (2021). Enabling the Internet of Things: Fundamentals, Design, and Applications. John Wiley & Sons. Hoboken, NJ.

2. Slama, D, Puhlmann, F, Morrish, J, Bhatnagar, R M. (2015). Enterprise IoT: Strategies & Best Practices for Connected Products & Services. O'Reilly. Sebastopol, CA.
  3. Margolis, M. (2020). Arduino Cookbook. O'Reilly. Sebastopol, CA.
  4. Halfacree, G. (2018). The Official Raspberry Pi Begineer's Guide: How to use your new computert. Raspberry Pi. Cambridge, UK.
  5. Dangi, N. (2017). Monitoring environmental parameters: humidity and temperature using Arduino based microcontroller and sensors (diplomski rad, engleski). Helsinki Metropolia University of Applied Sciences. Helsinki, Finland. Available at:  
[https://www.theseus.fi/bitstream/handle/10024/142235/Dangi\\_Nagendra.pdf?sequence=1](https://www.theseus.fi/bitstream/handle/10024/142235/Dangi_Nagendra.pdf?sequence=1)
- Language:** Croatian, English

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## Basics of electrical engineering and measurement (L136)

**ECTS: 5**

**Lectures: 30**

**Exercises: 30**

**Semester: 2**

**Course objective:**

1. To acquaint students with the operation and application of electronic elements, the design of electronic circuits, and basic terms and quantities in direct current circuits and the basic laws of current circuits
2. Develop knowledge and skills in the analysis and design of simple circuits and electronic circuits, application of measuring procedures for measuring electrical quantities, characteristics and applications of electromechanical and electronic measuring instruments and measuring methods,
3. To train students for independent measurements and application of measurement methods, for independent work in the design and maintenance of electronic systems, analysis of measured values of electrical quantities and basic calculation skills.

**Learning outcomes:**

1. Understand the physical foundations, concepts, quantities and phenomena used in electrical engineering and electronics, and recognize and know how to use basic electronic elements and measuring instruments
2. Explain and apply the basic laws of circuits (Ohm's law, Kirchhoff's laws, Thevenin's theorem, Norton's theorem) in calculations of direct current circuits, and design and analyze calculations of currents, voltages and power in simple direct current circuits. Measure electrical quantities in direct current circuits.
3. Analyze and evaluate the operation of semiconductor diodes and bipolar transistors in static and dynamic conditions, and measure the current-voltage characteristics of basic semiconductor elements.
4. Interpret and explain the concept of measurement uncertainty, apply the model of measurement uncertainty in simpler examples, analyze the measurement problem and identify sources of systematic and random errors, apply measures to eliminate measurement errors, and apply measurement methods for measuring electrical quantities
5. Describe the operation of measuring instruments (electrical and electronic) and create a complete measurement report, analyze and interpret measurement results
6. To develop a systematic way of thinking of students when defining problems, approaches to solving problems, checking the success of problem solutions and interpreting measurement results.

**Required reading:**

1. L. Havaš, J. Huđek: OSNOVE ELEKTROTEHNIKE 1 i 2, UNIN
2. J. Huđek: Zbirka riješenih zadataka iz Osnova elektrotehnike 1 i 2, UNIN
3. Teaching materials on the Merlin course page (presentations, R scripts, data for laboratory work, scientific and professional papers)
4. Kuphaldt, T R. (2023). Lessons in Electric Circuits. Available at: <https://www.allaboutcircuits.com/textbook/>
5. Söderby, K. (2023). Getting started with Arduino. Available at: <https://docs.arduino.cc/learn/starting-guide/getting-started-arduino>
6. Raghavendra, N V, Krishnamurthy, L. (2013). Engineering Metrology and Measurements. Oxford University Press. Oxford, UK



**Language:** Croatian, English

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## Writing a seminar thesis (L137)

**ECTS: 5**

**Lectures: 0**

**Exercises: 15**

**Semester: 2**

**Course objective:**

Introduction to the course: why write papers, especially seminar papers? Basic terms: expert work, scientific work, review work, research work. Preparation: choice of topic, literature, production calendar. Research paper: literature study, research, notes. Writing a paper. Consultations with a mentor. Writing a seminar paper: technical design, structure and content, citation of literature. Plagiarism. Delivery of work. Defense and assessment.

**Learning outcomes:**

1. Determine and define the characteristics and possibilities of application of knowledge on the topic covered in the seminar work.
2. Recognize the literature, written and online, necessary for further research into the content of the curriculum.
3. Define the technical design of the seminar work and professional and other complex works.
4. Define the structure and content of the seminar paper and professional and other complex papers.
5. Define and use the rules of citing literature in seminar, professional and other complex works.

**Required reading:**

1. Hercigonja-Szekeres, M.; (2022), Writing a seminar paper. Handbook for students, University of Croatian Zagorje Krapina, [online], <available at: [www.vhzk.hr](http://www.vhzk.hr)> [accessed 10/10/2022].
2. Hercigonja-Szekeres, M.; (2022), Instructions for writing a seminar paper, University of Croatian Zagorje Krapina, [online], available at: [www.vhzk.hr](http://www.vhzk.hr)> [accessed 10.10.2022].

**Language:** Croatian, English