#### Study plan

#### Name of study plan: Master Full-Time IS (EN) from 2023/24

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Intelligent Transport Systems

Type of study: Follow-up master full-time

Required credits: 120 Elective courses credits: 0 Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses Minimal number of credits of the block: 93

The role of the block: Z

Code of the group: 1S-NP-IS-EN-21/22

Name of the group: 1st Sem. Master Full-Time IS (EN) from 2021/22

Requirement credits in the group: In this group you have to gain 22 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 22 Note on the group:

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their Code Completion Credits Scope Semester Role members) Tutors, authors and guarantors (gar.) **ITS Mathematical Tools** 11MAI-E Z.ZK 2P+2C 7 7 Jan Pikryl Jan Pikryl Jan Pikryl (Gar.) Vehicles within ITS 16DITS-E Z,ZK 4 2P+2C Ζ Ζ Jan Leistner, Filip Kotas, David Lehet, Jaroslav Machan Geographical, information, localization and navigation systems 20GINS-E Z,ZK 6 3P+3C 7 Ζ Petr Bureš, František Kekula, Pavel Hrubeš, Zuzana Purkrábková Pavel Hrubeš Telematic systems and their design 20TSJ-E Z,ZK 6 3P+2C Ζ Ζ Petr Bureš, Ond ej P ibyl Petr Bureš ΚZ Ζ 23TBSS-E 2 2P+0C Z **Technology and Security of Sensor Networks** 

## Characteristics of the courses of this group of Study Plan: Code=1S-NP-IS-EN-21/22 Name=1st Sem. Master Full-Time IS (EN) from 2021/22

11MAI-E	ITS Mathematical Tools	Z,ZK	4					
Series, Fourier Series	Series, Fourier Series. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analysis to PDE. Fundamentals of							
Numerical Mathematic	s. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following models as ODEs.							
16DITS-E	Vehicles within ITS	Z,ZK	4					
Design of the vehicle v	vith focus on its use and function in frame of ITS. User requirement analyses. Economic aspects. Process of constructions in a	concept phase,	functional					
dependences and stru	cture of the designed object. Creation of functional models. Energy management and storages for ground vehicles, energy tra	insformations lead	ling to kinetic					
one. Propulsion syster	ns / traditional and alternative ones. Life-cycle analysis.							
20GINS-E	Geographical, information, localization and navigation systems	Z,ZK	6					
The subject is specialize	ed in problems of work with applications of geographic information systems with special attention to the specialization in the field o	f transport and tel	ecommunication.					
It introduces students	to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and dig	gitization methods	, and a number					
of other GIS related te	chnologies such as problem mapping, webmap, etc.							
20TSJ-E	Telematic systems and their design	Z,ZK	6					
Gradual detailed analy	sis of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management,	traffic manageme	ent, etc.					
23TBSS-E	Technology and Security of Sensor Networks	KZ	2					
The course focuses or	the safety of data collection in new areas of sensor networks. Principles of sensor networks, sensors of electrical and non-el	ectric quantities, i	nterfaces for					
sensor connection, co	mmunication technology for sensor networks. SigFox. LoRa. NB-IoT. IoT technology and SmartCity Trends in IoT and Smart (	City						

Code of the group: 1S-NP-IS-EN-V-21/22

Name of the group: 1st Sem. Master Full-Time IS (EN) Alternative from 2021/22

Requirement credits in the group: In this group you have to gain 3 credits Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 3

Note on the group:

12TDP-E

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
12TDP-E	Traffic Flow Theory Vladimír Faltus	Z,ZK	3	2P+1C	Z	Z
16ESDP-E	Electronic systems in modern vehicles  Dmitrij Rožd stvenský, Petr Bouchner	Z,ZK	3	2P+1C	Z	Z
20MZZ-E	Modern techniques of safety control of moving railway vehicles  Martin Leso Martin Leso	Z,ZK	3	2P+1C	Z	Z

#### Characteristics of the courses of this group of Study Plan: Code=1S-NP-IS-EN-V-21/22 Name=1st Sem. Master Full-Time IS (EN) Alternative from 2021/22

Traffic Flow Theory Mobility and associated human problems. Basic traffic parameters and their measurement. Estimation of quality of services. Theoretical fundamentals and applications of mathematical models. Macroscopic, statistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation between traffic models and traffic flow management. 16ESDP-E Electronic systems in modern vehicles Z,ZK

Advanced vehicle systems, electromobility, V2I and V2V, autonomous driving. Combustion engine control and electronic control units. Electric propulsion, its components, basic characteristics and control. Management of hybrid propulsion for attaining its optimal efficiency. Vehicle communication bus (CAN, LIN, FlexRay etc.). Safety, communication and comfort electronic vehicle systems. Practical exercises with real and simulated systems.

20MZZ-E Modern techniques of safety control of moving railway vehicles Z,ZK

ERTMS / ETCS concepts, ETCS architecture and interface descriptions, ERTMS system level, infrastructure and mobile part of the system, linking to stationary security systems, operating and application modes of the system, infrastructure orientation, interface (DMI), integration of the ETCS mobile part into the driving vehicle, GSM-R functional specification, testing and legislation

Code of the group: 2S-NP-IS-EN-21/22

Name of the group: 2nd Sem. Master Full-Time IS (EN) from 2021/22

Requirement credits in the group: In this group you have to gain 21 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 21 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
14CITS-E	C-ITS Systems	Z,ZK	6	3P+3C	L	Z
14PAM-E	Programming and modelling	Z,ZK	4	2P+2C	L	Z
14PD-E	Data processing	Z,ZK	6	2P+4C	L	Z
14PPRP-E	Computer Aided Project Management	KZ	2	0P+2C	L	Z
20BITS-E	Safety and reliability of ITS Systems	KZ	3	2P+1C	L	Z

#### Characteristics of the courses of this group of Study Plan: Code=2S-NP-IS-EN-21/22 Name=2nd Sem. Master Full-Time IS (EN) from 2021/22

14CITS-E	C-ITS Systems	Z,ZK	6					
Detailed description of C	C-ITS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focus	s on data exchang	je (CAM, DENM,					
IVI) and C-ITS security	VI) and C-ITS security architecture. Status quo and modern trends of wireless telecommunication solutions ITS-G5 and LTE-V and description of its properties and specifics. Course							
will also cover signal pro	ill also cover signal processing.							

14PAM-F Programming and modelling Z.ZK Object oriented programming, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, recursion, complexity, Lindenmeyer's grammars, paralism in nature and in real systems, paralel computer systems, paralel programming, discrete simulation, models of processes, model types As-Is a To-Be, acquisition

of analytical sources for modelling, BPMN language, SW Bizagi, model creation and life cycle. 14PD-E Data processing 7.7K

Students will learn about tools for data processing and analysis, using practical examples to try out the most common options used in data processing, including advanced options for presenting the results of analyses. In advanced methods, students will also perform specific analysis using Bayesian networks. Students will then independently perform data analysis on data from existing open systems.

Computer Aided Project Management

What is the project? The basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specification of the assignment, activity definition, stages, objectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of the project outline (activities, restrictions, assignments, calendars etc.) Project planning and optimization - time, resources.

20BITS-E Safety and reliability of ITS Systems

<Z |

3

The basic concepts of safety and reliability in the job and application. Basic schema and types of diagnostic systems including reliability diagnostics of technical equipment and ITS. Investigation of acceptability and reliability prediction, traffic crity and sensitivity analysis. Neural Networks and other optimization algorithms and ETA, FMEA failure analysis. HMI in traffic including operator testing on simulator and in real-world situatiation

Code of the group: 2S-NP-IS-EN-V-21/22

Name of the group: 2nd Sem. Master Full-Time IS (EN) Alternative from 2021/22

Requirement credits in the group: In this group you have to gain 3 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 3 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
14MIM-E	Microsimulation Models	KZ	3	0P+3C	L	Z
16SHMI-E	Simulation and HMI	Z,ZK	3	2P+1C	L	Z
20ITSR-E	ITS - R	Z,ZK	3	2P+1C	L	Z

## Characteristics of the courses of this group of Study Plan: Code=2S-NP-IS-EN-V-21/22 Name=2nd Sem. Master Full-Time IS (EN) Alternative from 2021/22

14MIM-E Microsimulation Models

Basic knowledge of traffic modeling and simulation will be broaded by the application of traffic control algorithms to traffic microsimulation models used in ITS. These include, for example, the proposal of algorithms for actuated signal control, pedestrian preference, dynamic network routing, road line traffic control, crossing security equipment, and PT preference. Algorithms will be designed, applied, and tested by students themselves.

16SHMI-E Simulation and HMI

Z,ZK

3

Simulation for the systems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for ITS. Simulation theory with application of computing equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle dynamics, on-land carriage in particular. Virtual reality systems.

20ITSR-E | ITS - R

Z,ZK

( 3

The introduction is devoted to description of the architecture and interface of the system with the ITS-R concept, the communication interface of the system, principles of ensuring functional and security features are defined. The principles of ERTMS / ETCS application level 3, UGTMS, CBTC are discussed in detail. Current and future communication technologies are described.

Code of the group: 3S-NP-IS-EN-21/22

Name of the group: 3rd Sem. Master Full-Time IS (EN) from 2021/22

Requirement credits in the group: In this group you have to gain 21 credits

Requirement courses in the group: In this group you have to complete 4 courses

Credits in the group: 21

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11MMAD-E	Mathematical Methods for Data Analysis Magdalena Hykšová, Ivan Nagy Magdalena Hykšová Magdalena Hykšová (Gar.)	Z,ZK	6	3P+3C	Z	Z
20AIMI-E	Application of ITS in Urban Engineering Ji í Brož, Zuzana arská, Dagmar Ko árková, Josef Kocourek, Josef Filip, Ji í R ži ka, Tomáš Tichý Tomáš Tichý	Z,ZK	6	3P+3C	Z	Z
20SYIN-E	System Engineering Zuzana B linová Zuzana B linová	Z,ZK	6	4P+2C	Z	Z
20HEI-E	Evaluation and Economics of ITS  Jakub Rajnoch Jakub Rajnoch	KZ	3	2P+1C	Z	Z

### Characteristics of the courses of this group of Study Plan: Code=3S-NP-IS-EN-21/22 Name=3rd Sem. Master Full-Time IS (EN) from 2021/22

11MMAD-E	Mathematical Methods for Data Analysis	Z,ZK	6
Stocastic modelling, es	timation, prediction, filtration, control, methods of data analysis: k-means, DBSCAN, naive Bayes, decision trees, support vec	ctor machine.	
20AIMI-E	Application of ITS in Urban Engineering	Z,ZK	6

The course focuses mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization of the public space, concept of public space solutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, MHD, cyclo, modes etc. New approaches to the development of Smart and green approaches Promoting into Public.

0SYIN-E System Engineering

Z,ZK

6

Enhanced system definition in engineering tasks, specification of selected system types against related tools of system analysis and design, refinement of selected types of system engineering tasks, definition of system strategy, connection to science-based methodological basics of transport, strategic thinking processes, strategic management system, context of sustainable development.

20HEI-E Evaluation and Economics of ITS

Introduction of subject is devoted to the basics of system approach to development of ITS architecture and fundamentals in the field of economic attributes connected with development of ITS. Subsequently, the basic principles of system and application creation in the technical field are discussed, defining the penetration of the technical solution into the economy. The subject is terminated by a detailed breakdown of case studies.

Code of the group: 3S-NP-IS-EN-V-21/22

Name of the group: 3rd Sem. Master Full-Time IS (EN) Alternative from 2021/22

Requirement credits in the group: In this group you have to gain 3 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 3 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
16KSD-E	Quality and reliability in area of transportation means and systems  Jan Leistner, Filip Kotas, David Lehet, Jaroslav Machan	Z,ZK	3	2P+1C	Z	Z
20PRZP-E	Computer aided railway traffic control Dušan Kamenický Dušan Kamenický	Z,ZK	3	2P+1C	Z	Z
20TVHD-E	Telematics in Public Transport Patrik Horaž ovský, Milan Sliacky Milan Sliacky	Z,ZK	3	2P+1C	Z	Z

# Characteristics of the courses of this group of Study Plan: Code=3S-NP-IS-EN-V-21/22 Name=3rd Sem. Master Full-Time IS (EN) Alternative from 2021/22

16KSD-E Quality and reliability in area of transportation means and systems Z,ZK 3

Quality methods used for design, manufacturing and operation. Methods QFD, DFM, DFA, DFS. Longtime testing. FMEA method. Operation reliability. Methods for process optimizing, process design and quality improvement (Six Sigma etc.). Certification and accreditation, quality management, tools and methods for quality stabilization and improvement. Students will work on real problems in the QFD laboratory.

20PRZP-E Computer aided railway traffic control

Z,ZK

Introduction is devoted to clarifying the reasons and basic principles of automation of the management of railway transport. It explains the structure of railway traffic management, including the main principles applied in the management of railway traffic. The main part is devoted to detailed description of the individual components of the system, which must be included in the systems for automation of railway traffic control using computer technologies.

20TVHD-E Telematics in Public Transport

Z,ZK

3

3

Ticketing and information systems; foreinght experiences; vehicle technology; dispatching systems; Information Systems; data structures; clearing; Public Transport preferences; vehicle position monitoring; legislative framework; standardization, certification and interoperability.

Code of the group: XD-NP-IS-EN-21/22

Name of the group: Thesis Master Full-Time IS (EN) from 2021/22

Requirement credits in the group: In this group you have to gain 16 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 16 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11XNDS-E	Master Thesis for study programme IS  Jan P ikryl	Z	16	0P+16C	L	Z
12XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
14XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
15XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
16XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
17XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
18XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
20XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
21XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
22XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z
23XNDS-E	Master Thesis for study programme IS	Z	16	0P+16C	L	Z

### Characteristics of the courses of this group of Study Plan: Code=XD-NP-IS-EN-21/22 Name=Thesis Master Full-Time IS (EN) from 2021/22

11XNDS-E	Master Thesis for study programme IS	Z	16
12XNDS-E	Master Thesis for study programme IS	Z	16

14XNDS-E	Master Thesis for study programme IS	Z	16
15XNDS-E	Master Thesis for study programme IS	Z	16
16XNDS-E	Master Thesis for study programme IS	Z	16
17XNDS-E	Master Thesis for study programme IS	Z	16
18XNDS-E	Master Thesis for study programme IS	Z	16
20XNDS-E	Master Thesis for study programme IS	Z	16
21XNDS-E	Master Thesis for study programme IS	Z	16
22XNDS-E	Master Thesis for study programme IS	Z	16
23XNDS-E	Master Thesis for study programme IS	Z	16

Code of the group: XP-NP-IS-EN-21/22

Name of the group: Praxis Master Full-Time IS (EN) from 2021/22

Requirement credits in the group: In this group you have to gain 4 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 4 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11XPXS-E	Training course for study programme IS  Jan P ikryl	Z	4	0P+4C	L	Z
12XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
14XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
15XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
16XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
17XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
18XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
20XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
21XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
22XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z
23XPXS-E	Training course for study programme IS	Z	4	0P+4C	L	Z

Characteristics of the courses of this group of Study Plan: Code=XP-NP-IS-EN-21/22 Name=Praxis Master Full-Time IS (EN) from 2021/22

Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
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Training course for study programme IS	Z	4
Training course for study programme IS	Z	4
	Training course for study programme IS	Training course for study programme IS  Z

Name of the block: Semestrální projekt Minimal number of credits of the block: 27

The role of the block: ZP

Code of the group: X2-NP-IS-EN-21/22

Name of the group: Research Groups Master Full-Time IS (EN) from 2021/22 Requirement credits in the group: In this group you have to gain 27 credits

Requirement courses in the group: In this group you have to complete 4 courses

Credits in the group: 27 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11XN1S-E	Master project 1 for study programme IS  Jan P ikryl, Evženie Uglickich, Bohumil Ková Jan P ikryl Evženie Uglickich (Gar.)	Z	5	0P+4C	Z	ZP
12XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
14XN1S-E	Master project 1 for study programme IS  Martin Šrotý Martin Šrotý (Gar.)	Z	5	0P+4C	Z	ZP
15XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
16XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
17XN1S-E	Jan Leistner, David Lehet, Tereza Kunčlová  Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
18XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
20XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
	Martin Leso			-		
21XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
22XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
23XN1S-E	Master project 1 for study programme IS	Z	5	0P+4C	Z	ZP
11XN2S-E	Master project 2 for study programme IS  Jan P ikryl	Z	6	0P+4C	L	ZP
12XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
14XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
15XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
16XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
17XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
18XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
20XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
21XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
22XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
23XN2S-E	Master project 2 for study programme IS	Z	6	0P+4C	L	ZP
11XN3S-E	Master project 3 for study programme IS  Jan P ikryl Jan P ikryl Jan P ikryl (Gar.)	Z	6	0P+4C	Z	ZP
12XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
14XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
15XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
16XN3S-E	Master project 3 for study programme IS Petr Bouchner, Na a Tylová	Z	6	0P+4C	Z	ZP
17XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
18XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
20XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
21XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
22XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
23XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
11XN4S-E	Master project 4 for study programme IS  Jan P ikryl	Z	10	0P+8C	L	ZP
12XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
14XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
15XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
16XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
17XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
18XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
20XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
21XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
22XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
23XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C		ZP

Characteristics of the courses of this group of Study Plan: Code=X2-NP-IS-EN-21/22 Name=Research Groups Master Full-Time IS (EN) from 2021/22

11XN1S-E	Master project 1 for study programme IS	Z	5
12XN1S-E	Master project 1 for study programme IS	Z	5
14XN1S-E	Master project 1 for study programme IS	Z	5
15XN1S-E	Master project 1 for study programme IS	Z	5
16XN1S-E	Master project 1 for study programme IS	Z	5
17XN1S-E	Master project 1 for study programme IS	Z	5
18XN1S-E	Master project 1 for study programme IS	Z	5
20XN1S-E	Master project 1 for study programme IS	Z	5
21XN1S-E	Master project 1 for study programme IS	Z	5
22XN1S-E	Master project 1 for study programme IS	Z	5
23XN1S-E	Master project 1 for study programme IS	Z	5
11XN2S-E	Master project 2 for study programme IS	Z	6
12XN2S-E	Master project 2 for study programme IS	Z	6
14XN2S-E	Master project 2 for study programme IS	Z	6
15XN2S-E	Master project 2 for study programme IS	Z	6
16XN2S-E	Master project 2 for study programme IS	Z	6
17XN2S-E	Master project 2 for study programme IS	Z	6
18XN2S-E	Master project 2 for study programme IS	Z	6
20XN2S-E	Master project 2 for study programme IS	Z	6
21XN2S-E	Master project 2 for study programme IS	Z	6
22XN2S-E	Master project 2 for study programme IS	Z	6
23XN2S-E	Master project 2 for study programme IS	Z	6
11XN3S-E	Master project 3 for study programme IS	Z	6
12XN3S-E	Master project 3 for study programme IS	Z	6
14XN3S-E	Master project 3 for study programme IS	Z	6
15XN3S-E	Master project 3 for study programme IS	Z	6
16XN3S-E	Master project 3 for study programme IS	Z	6
17XN3S-E	Master project 3 for study programme IS	Z	6
18XN3S-E	Master project 3 for study programme IS	Z	6
20XN3S-E	Master project 3 for study programme IS	Z	6
21XN3S-E	Master project 3 for study programme IS	Z	6
22XN3S-E	Master project 3 for study programme IS	Z	6
23XN3S-E	Master project 3 for study programme IS	Z	6
11XN4S-E	Master project 4 for study programme IS	Z	10
12XN4S-E	Master project 4 for study programme IS	Z	10
14XN4S-E	Master project 4 for study programme IS	Z	10
15XN4S-E	Master project 4 for study programme IS	Z	10
16XN4S-E	Master project 4 for study programme IS	Z	10
17XN4S-E	Master project 4 for study programme IS	Z	10
18XN4S-E	Master project 4 for study programme IS	Z	10
20XN4S-E	Master project 4 for study programme IS	Z	10
21XN4S-E	Master project 4 for study programme IS	Z	10
22XN4S-E	Master project 4 for study programme IS	Z	10
23XN4S-E	Master project 4 for study programme IS	Z	10

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: VP-NP-IS-EN

Name of the group: Master Full-Time IS (EN) voluntary

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
15JIA1-E	Foreign Language - English 1 Dana Boušová, Jitka He manová, Marie Michlová, Lenka Monková, Peter Morpuss, Markéta Vojanová, Eva Rezlerová, Markéta Musilová	Z	0	0P+2C	Z	V

15JIN1-E  Foreign Language - German 1 Eva Rezlerová, Martina Navrátilová, Jana Štikarová  Foreign Language - Russian 1 Marie Michlová	Z	i –			
15JIR1-E Foreign Language - Russian 1 Marie Michlová	_	0	0P+2C	Z	V
	Z	0	0P+2C		V
5JIS1-E Foreign Language - Spanish 1	Z	0	0P+2C	Z	V
Nina Hricsina Puškinová Zuzana Krinková (Gar.)	Z	1			
5JIA2-E Foreign Language - English 2 5JIF2-E Foreign Language - French 2	Z	0	0P+2C 0P+2C	L	V
r or origin Language 1 ronon L	Z	0	0P+2C 0P+2C	L	V
i orongii Lunguago Coman L	Z	1	0P+2C		V
Total Language Massian L		0		L	V
5JIS2-E Foreign Language - Spanish 2  Zuzana Krinková (Gar.)	Z	0	0P+2C	L	V
Foreign Language - English 3  Jitka He manová, Marie Michlová, Lenka Monková, Peter Morpuss, Markéta Vojanová, Eva Rezlerová, Markéta Musilová	Z	0	0P+2C	Z	V
15JIF3-E Foreign Language - French 3 Irena Veselková	Z	0	0P+2C	Z	V
15JIN3-E Foreign Language - German 3  Eva Rezlerová, Martina Navrátilová, Jana Štikarová	Z	0	0P+2C	Z	V
15JIR3-E Foreign Language - Russian 3  Marie Michlová	Z	0	0P+2C	Z	V
15JIS3-E Foreign Language - Spanish 3 Nina Hricsina Puškinová Zuzana Krinková (Gar.)	Z	0	0P+2C	Z	V
15JIA4-E Foreign Language - English 4	Z	0	0P+2C	L	V
15JIF4-E Foreign Language - French 4	Z	0	0P+2C	L	V
15JIN4-E Foreign Language - German 4	Z	0	0P+2C	L	V
15JIR4-E Foreign Language - Russian 4	Z	0	0P+2C	L	V
5JIS4-E Foreign Language - Spanish 4  Zuzana Krinková (Gar.)	Z	0	0P+2C	L	V
					arning
Programmes - English Connections, English Library, the Internet).  15JIF1-E Foreign Language - French 1  Basic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing	g myself, phonetic	s of foreign		z	0
ISJIF1-E Foreign Language - French 1  Basic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing groups texts with professional topics.	g myself, phonetic	s of foreign	language, wri	Z ting skills, in	0 advanced
5JIF1-E   Foreign Language - French 1   Basic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing			language, wri	Z ting skills, in	0 advanced
SJIF1-E			language, wri	Z ting skills, in	0 advanced 0 advanced
5JIF1-E Foreign Language - French 1 Basic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir irroups texts with professional topics.  5JIN1-E Foreign Language - German 1 Basic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir irroups texts with professional topics.  5JIR1-E Foreign Language - Russian 1	ng myself, phonetic	s of foreign	language, wri	Z   ting skills, in Z   ting skills, in Z	0 advanced 0 advanced
5JIF1-E Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.	ng myself, phonetic	s of foreign	language, wri	Z   ting skills, in Z   ting skills, in Z	0 advanced 0 advanced
Foreign Language - French 1	g myself, phonetic	s of foreign	language, wri	Z   ting skills, in   Ting ski	0 advanced 0 advanced 0 advanced 0
5JIF1-E Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.	g myself, phonetic	s of foreign	language, wri	Z   ting skills, in   Ting ski	0 advanced 0 advanced 0 advanced 0 advanced
Foreign Language - French 1	ng myself, phonetic ng myself, phonetic ng myself, phonetic	s of foreign	language, wri	Z ting skills, in  Z ting skills, in  Z ting skills, in  Z ting skills, in	0 advanced 0 advanced 0 advanced 0 advanced 0 advanced
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 Vork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal	ng myself, phonetic ng myself, phonetic ng myself, phonetic language. Improve	s of foreign s of foreign s of foreign	language, wri	Z ting skills, in Z ting skills, in Z ting skills, in Z ting skills, in Z kills, in	0 advanced 0 advanced 0 advanced 0 advanced 0 advanced
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 Vork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal anguage in presentations within students' specialization field both in verbal and written form. Language laboratory engages.	ng myself, phonetic ng myself, phonetic ng myself, phonetic language. Improve	s of foreign s of foreign s of foreign	language, wri	Z ting skills, in Z ting skills, in Z ting skills, in Z ting skills, in Z kills, in	0 advanced 0 advanced 0 advanced 0 advanced 0 advanced
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 //ork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal inguage in presentations within students' specialization field both in verbal and written form. Language laboratory english Connections, English Library, the Internet).  5JIF2-E Foreign Language - French 2	ng myself, phonetic ng myself, phonetic ng myself, phonetic language. Improve	s of foreign s of foreign s of foreign ement of col	language, wri	Z ting skills, in  Z ting skills, in  Z ting skills, in  Z kills, in  Z kills. Active unive learning (	0 advanced 0 advanced 0 advanced 0 advanced 0 programme 0
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 //ork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal inguage in presentations within students' specialization field both in verbal and written form. Language laboratory english Connections, English Library, the Internet).  5JIF2-E Foreign Language - French 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir necessary.	ng myself, phonetic ng myself, phonetic ng myself, phonetic language. Improve	s of foreign s of foreign s of foreign ement of col	language, wri	Z ting skills, in  Z ting skills, in  Z ting skills, in  Z kills, in  Z kills. Active unive learning (	0 advanced 0 advanced 0 advanced 0 advanced 0 programme 0
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 //ork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal inguage in presentations within students' specialization field both in verbal and written form. Language laboratory english Connections, English Library, the Internet).  5JIF2-E Foreign Language - French 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.	ng myself, phonetic ng myself, phonetic ng myself, phonetic language. Improve	s of foreign s of foreign s of foreign ement of col	language, wri	Z ting skills, in  Z ting skills, in  Z ting skills, in  Z kills, in  Z kills. Active unive learning (	0 advanced 0 advanced 0 advanced 0 advanced 0 programme 0
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIA2-E Foreign Language - English 2 //ork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal roups are presentations within students' specialization field both in verbal and written form. Language laboratory english Connections, English Library, the Internet).  5JIF2-E Foreign Language - French 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN2-E Foreign Language - German 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a	s of foreign s of foreign ement of cor lternatively	language, wri	Z ting skills, in Z	0 advanced 0
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.  5JIN1-E Foreign Language - German 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.  5JIR1-E Foreign Language - Russian 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.  5JIS1-E Foreign Language - Spanish 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.  5JIA2-E Foreign Language - English 2 Vork on specialised texts and technical terminology. Lexical-grammatical structures of higher command. Formal inguage in presentations within students' specialization field both in verbal and written form. Language laboratory expected in presentations within students' specialization field both in verbal and written form. Language laboratory expected in presentations, English Library, the Internet).  5JIF2-E Foreign Language - French 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.  5JIN2-E Foreign Language - German 2 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing texts with professional topics.	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a	s of foreign s of foreign ement of cor lternatively	language, wri	Z   ting skills, in	0 advanced
Foreign Language - French 1 asic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducir roups texts with professional topics.  5JIN1-E	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a ing myself, phonetic	s of foreign s of foreign ement of coulternatively as	language, wri	Z ting skills, in	0 advanced 0
Foreign Language - French 1  Sasic structures of foreign language, communication in everyday life, study, work, leiser time activities, introducing roups texts with professional topics.  5JIN1-E	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a ing myself, phonetic	s of foreign s of foreign ement of coulternatively as	language, wri	Z ting skills, in	0 advanced 0
Foreign Language - French 1	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a ig myself, phonetic ig myself, phonetic	s of foreign s of foreign ment of contemporary s of foreign s of foreign s of foreign	language, wri	Z ting skills, in	O advanced O action of the properties o
Foreign Language - French 1	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a ig myself, phonetic ig myself, phonetic ig myself, phonetic	s of foreign s of foreign ment of con lternatively: s of foreign s of foreign s of foreign	language, wri	Z   ting skills, in	O advanced O action of the properties o
Foreign Language - French 1	ig myself, phonetic ig myself, phonetic ig myself, phonetic language. Improve invironment used a ig myself, phonetic ig myself, phonetic ig myself, phonetic	s of foreign s of foreign ment of con lternatively: s of foreign s of foreign s of foreign	language, wri	Z   ting skills, in	O advanced O action of the properties o

0P+2C

Ζ

Foreign Language - French 1 Irena Veselková

15JIF1-E

groups texts with professional topics.

15JIN3-E	Foreign Language - German 3	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang	uage, writing skills,	, in advanced
15JIR3-E	Foreign Language - Russian 3	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang fessional topics.	uage, writing skills,	, in advanced
15JIS3-E	Foreign Language - Spanish 3	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang fessional topics.	uage, writing skills,	, in advanced
15JIA4-E	Foreign Language - English 4	Z	0
Presentation Skills - FCE, CAE.	expert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement.	Optional courses for	or certificates
15JIF4-E	Foreign Language - French 4	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang fessional topics.	uage, writing skills,	, in advanced
15JIN4-E	Foreign Language - German 4	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang	uage, writing skills,	, in advanced
15JIR4-E	Foreign Language - Russian 4	Z	0
Basic structures of for groups texts with pro	oreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign lang fessional topics.	uage, writing skills,	, in advanced
15JIS4-E	Foreign Language - Spanish 4	Z	0

#### List of courses of this pass:

Code	Name of the course	Completion	Credits
11MAI-E	ITS Mathematical Tools	Z,ZK	4
Series, Fourier	Series. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analysi	s to PDE. Fundar	nentals of
٨	umerical Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following models	ls as ODEs.	
11MMAD-E	Mathematical Methods for Data Analysis	Z,ZK	6
	c modelling, estimation, prediction, filtration, control, methods of data analysis: k-means, DBSCAN, naive Bayes, decision trees, support	ort vector machine	9.
11XN1S-E	Master project 1 for study programme IS	Z	5
11XN2S-E	Master project 2 for study programme IS	Z	6
11XN3S-E	Master project 3 for study programme IS	Z	6
11XN4S-E	Master project 4 for study programme IS	Z	10
11XNDS-E	Master Thesis for study programme IS	Z	16
11XPXS-E	Training course for study programme IS	Z	4
12TDP-E	Traffic Flow Theory	Z,ZK	3
Mobility and assoc	i lated human problems. Basic traffic parameters and their measurement. Estimation of quality of services. Theoretical fundamentals and		athematic
models. Macrosco	pic, statistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation between	een traffic model	s and traffi
	flow management.		
12XN1S-E	Master project 1 for study programme IS	Z	5
12XN2S-E	Master project 2 for study programme IS	Z	6
12XN3S-E	Master project 3 for study programme IS	Z	6
12XN4S-E	Master project 4 for study programme IS	Z	10
12XNDS-E	Master Thesis for study programme IS	Z	16
12XPXS-E	Training course for study programme IS	Z	4
14CITS-E	C-ITS Systems	Z,ZK	6
	n of C-ITS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focus on		AM, DENN
IVI) and C-ITS sec	urity architecture. Status quo and modern trends of wireless telecommunication solutions ITS-G5 and LTE-V and description of its pro-	perties and speci	fics. Course
	will also cover signal processing.		
14MIM-E	Microsimulation Models	KZ	3
Basic knowledg	e of traffic modeling and simulation will be broaded by the application of traffic control algorithms to traffic microsimulation models use	d in ITS. These in	clude, for
example, the propo	isal of algorithms for actuated signal control, pedestrian preference, dynamic network routing, road line traffic control, crossing security e	quipment, and PT	preference
	Algorithms will be designed, applied, and tested by students themselves.		
14PAM-E	Programming and modelling	Z,ZK	4
	ogramming, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, recursio		•
grammars, paralis	m in nature and in real systems, paralel computer systems, paralel programming, discrete simulation, models of processes, model typostems of analytical sources for modelling, BPMN language, SW Bizagi, model creation and life cycle.	es As-Is a To-Be,	acquisition
14PD-E	Data processing	Z,ZK	6
Students will learn	about tools for data processing and analysis, using practical examples to try out the most common options used in data processing, in	ncluding advance	d options fo
presenting the res	ults of analyses. In advanced methods, students will also perform specific analysis using Bayesian networks. Students will then indepe	ndently perform d	ata analysi
-	on data from existing open systems.		•

14PPRP-E	Computer Aided Project Management	KZ	2
	ne basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specification of t		_
	ectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of the pro-		
	restrictions, assignments, calendars etc.) Project planning and optimization - time, resources.		
14XN1S-E	Master project 1 for study programme IS	Z	5
14XN2S-E	Master project 2 for study programme IS	Z	6
14XN3S-E	Master project 3 for study programme IS	Z	6
14XN4S-E	Master project 4 for study programme IS	Z	10
14XNDS-E	Master Thesis for study programme IS		16
	7.1 0		
14XPXS-E	Training course for study programme IS	Z	4
15JIA1-E	Foreign Language - English 1	Z	0
•	and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communication sions within students' specialization field both in verbal and written forms. Language laboratory environment used alternatively as a		
language in presentar	(Programmes - English Connections, English Library, the Internet).	tool for active	learning
15JIA2-E	Foreign Language - English 2	Z	0
	and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communication s	_	_
•	within students' specialization field both in verbal and written form. Language laboratory environment used alternatively as a tool for ac		
33.	- English Connections, English Library, the Internet).	3 (	3
15JIA3-E	Foreign Language - English 3	Z	0
	ert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement. Options		_
	FCE, CAE.		
15JIA4-E	Foreign Language - English 4	Z	0
	ert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement. Options		1
	FCE, CAE.		
15JIF1-E	Foreign Language - French 1	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advanc
	groups texts with professional topics.		
15JIF2-E	Foreign Language - French 2	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advanc
	groups texts with professional topics.		
15JIF3-E	Foreign Language - French 3	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advanc
	groups texts with professional topics.		
15JIF4-E	Foreign Language - French 4	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advance
	groups texts with professional topics.		
15JIN1-E	Foreign Language - German 1	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advance
45 1110 5	groups texts with professional topics.		
15JIN2-E	Foreign Language - German 2	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	advanc
45 UNIO 5	groups texts with professional topics.		
15JIN3-E	Foreign Language - German 3	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, v	riting skills, in	advance
45 UNI 4 E	groups texts with professional topics.	7	
15JIN4-E	Foreign Language - German 4 gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	Z riting skills in	0
basic structures or lorer	groups texts with professional topics.	mung skilis, in	auvanci
15JIR1-E		Z	0
l l	Foreign Language - Russian 1 gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w		_
basic structures or lorer	groups texts with professional topics.	ming skiils, iii	auvano
15JIR2-E	Foreign Language - Russian 2	Z	0
	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w		_
basic structures or lorer	groups texts with professional topics.	riting sitilis, in	aavano
15JIR3-E	Foreign Language - Russian 3	Z	0
	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	_	_
	groups texts with professional topics.		
15JIR4-E	Foreign Language - Russian 4	Z	0
	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w		_
	groups texts with professional topics.	5 -,	
15JIS1-E	Foreign Language - Spanish 1	Z	0
	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w		
	groups texts with professional topics.	- '	
15JIS2-E	Foreign Language - Spanish 2	Z	0
	Spanish language, communication in everyday life, study, work, leisere time activities, introducing myself, phonetics of Spanish language.		
15JIS3-E	Foreign Language - Spanish 3	Z	0
	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language, w	riting skills, in	_

groups texts with professional topics.

15JIS4-E	Foreign Language - Spanish 4	Z	0
	foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign languaç		_
	groups texts with professional topics.		
15XN1S-E	Master project 1 for study programme IS	Z	5
15XN2S-E	Master project 2 for study programme IS	Z	6
15XN3S-E	Master project 3 for study programme IS	Z	6
15XN4S-E	Master project 4 for study programme IS	Z	10
15XNDS-E	Master Thesis for study programme IS	Z	16
15XPXS-E	Training course for study programme IS	Z	4
16DITS-E	Vehicles within ITS	Z,ZK	4
-	chicle with focus on its use and function in frame of ITS. User requirement analyses. Economic aspects. Process of constructions in a		
dependences and	structure of the designed object. Creation of functional models. Energy management and storages for ground vehicles, energy trans	formations leading	ng to kineti
4050555	one. Propulsion systems / traditional and alternative ones. Life-cycle analysis.	7.71	
16ESDP-E	Electronic systems in modern vehicles	Z,ZK	3
	e systems, electromobility, V2I and V2V, autonomous driving. Combustion engine control and electronic control units. Electric propuls on control. Management of hybrid propulsion for attaining its optimal efficiency. Vehicle communication bus (CAN, LIN, FlexRay etc.).		
characteristics at	comfort electronic vehicle systems. Practical exercises with real and simulated systems.	Calcty, communic	cation and
16KSD-E	Quality and reliability in area of transportation means and systems	Z,ZK	3
	ed for design, manufacturing and operation. Methods QFD, DFM, DFA, DFS. Longtime testing. FMEA method. Operation reliability. M		_
rocess design and	quality improvement (Six Sigma etc.). Certification and accreditation, quality management, tools and methods for quality stabilization	n and improveme	ent. Studer
	will work on real problems in the QFD laboratory.		
16SHMI-E	Simulation and HMI	Z,ZK	3
	ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics		
oplication of comp	uting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle particular. Virtual reality systems.	dynamics, on-ian	id carriage
16XN1S-E	Master project 1 for study programme IS	Z	5
16XN2S-E	Master project 1 for study programme IS	Z	6
16XN3S-E	Master project 2 for study programme IS	Z	6
16XN4S-E	· · · · · · · · · · · · · · · · · · ·	Z	10
16XNDS-E	Master project 4 for study programme IS	Z	_
	Master Thesis for study programme IS		16
16XPXS-E	Training course for study programme IS	Z	4
17XN1S-E	Master project 1 for study programme IS	Z	5
17XN2S-E	Master project 2 for study programme IS	Z	6
17XN3S-E	Master project 3 for study programme IS	Z	6
17XN4S-E	Master project 4 for study programme IS	Z	10
17XNDS-E	Master Thesis for study programme IS	Z	16
17XPXS-E	Training course for study programme IS	Z	4
18XN1S-E	Master project 1 for study programme IS	Z	5
18XN2S-E	Master project 2 for study programme IS	Z	6
18XN3S-E	Master project 3 for study programme IS	Z	6
18XN4S-E	Master project 4 for study programme IS	Z	10
18XNDS-E	Master Thesis for study programme IS	Z	16
18XPXS-E	Training course for study programme IS	Z	4
20AIMI-E	Application of ITS in Urban Engineering	Z,ZK	6
	mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization		
or public space so	lutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, approaches to the development of Smart and green approaches Promoting into Public.	MIND, Cyclo, Mod	es etc. Ne
20BITS-E	Safety and reliability of ITS Systems	KZ	3
	s of safety and reliability in the job and application. Basic schema and types of diagnostic systems including reliability diagnostics of		
	ceptability and reliability prediction, traffic crity and sensitivity analysis. Neural Networks and other optimization algorithms and ETA,		
	traffic including operator testing on simulator and in real-world situatiation		
20GINS-E	Geographical, information, localization and navigation systems	Z,ZK	6
	alized in problems of work with applications of geographic information systems with special attention to the specialization in the field of tra	=	
introduces studei	nts to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitiz	ation methods, ar	na a numb
30HELE	of other GIS related technologies such as problem mapping, webmap, etc.		2
20HEI-E troduction of subje	Evaluation and Economics of ITS ect is devoted to the basics of system approach to development of ITS architecture and fundamentals in the field of economic attribute	KZ s connected with	developme
	attly, the basic principles of system and application creation in the technical field are discussed, defining the penetration of the technic		-
2 2 2 4 30.	The subject is terminated by a detailed breakdown of case studies.		
20ITSR-E	ITS - R	Z,ZK	3
	s devoted to description of the architecture and interface of the system with the ITS-R concept, the communication interface of the sy	,	1
ınctional and secu	rity features are defined. The principles of ERTMS / ETCS application level 3, UGTMS, CBTC are discussed in detail. Current and futur	e communication	technolog
	are described.		
<del></del>	Madage tacks in the state of a state as extended from a visit we will use the state of	ファン	3
20MZZ-E	Modern techniques of safety control of moving railway vehicles	Z,ZK	1
ERTMS / ETCS	oncepts, ETCS architecture and interface descriptions, ERTMS system level, infrastructure and mobile part of the system, linking to cation modes of the system, infrastructure orientation, interface (DMI), integration of the ETCS mobile part into the driving vehicle, G	stationary securit	ty systems

20PRZP-E	Computer aided railway traffic control	Z,ZK	3
	evoted to clarifying the reasons and basic principles of automation of the management of railway transport. It explains the structure of principles applied in the management of railway traffic. The main part is devoted to detailed description of the individual components included in the systems for automation of railway traffic control using computer technologies.	-	-
20SYIN-E	System Engineering	Z,ZK	6
Enhanced system	of definition in engineering tasks, specification of selected system types against related tools of system analysis and design, refinement definition of system strategy, connection to science-based methodological basics of transport, strategic thinking processes, strategic of sustainable development.	nt of selected types	s of system
20TSJ-E	Telematic systems and their design	Z,ZK	6
	ed analysis of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management		_
20TVHD-E	Telematics in Public Transport	Z,ZK	3
	mation systems; foreinght experiences; vehicle technology; dispatching systems; Information Systems; data structures; clearing; Public position monitoring; legislative framework; standardization, certification and interoperability.		nces; vehicle
20XN1S-E	Master project 1 for study programme IS	Z	5
20XN2S-E	Master project 2 for study programme IS	Z	6
20XN3S-E	Master project 3 for study programme IS	Z	6
20XN4S-E	Master project 4 for study programme IS	Z	10
20XNDS-E	Master Thesis for study programme IS	Z	16
20XPXS-E	Training course for study programme IS	Z	4
21XN1S-E	Master project 1 for study programme IS	Z	5
21XN2S-E	Master project 2 for study programme IS	Z	6
21XN3S-E	Master project 3 for study programme IS	Z	6
21XN4S-E	Master project 4 for study programme IS	Z	10
21XNDS-E	Master Thesis for study programme IS	Z	16
21XPXS-E	Training course for study programme IS	Z	4
22XN1S-E	Master project 1 for study programme IS	Z	5
22XN2S-E	Master project 2 for study programme IS	Z	6
22XN3S-E	Master project 3 for study programme IS	Z	6
22XN4S-E	Master project 4 for study programme IS	Z	10
22XNDS-E	Master Thesis for study programme IS	Z	16
22XPXS-E	Training course for study programme IS	Z	4
23TBSS-E	Technology and Security of Sensor Networks	KZ	2
	ses on the safety of data collection in new areas of sensor networks. Principles of sensor networks, sensors of electrical and non-electors or connection, communication technology for sensor networks, SigFox, LoRa, NB-IoT, IoT technology and SmartCity. Trends in IoT		erfaces for
23XN1S-E	Master project 1 for study programme IS	Z	5
23XN2S-E	Master project 2 for study programme IS	Z	6
23XN3S-E	Master project 3 for study programme IS	Z	6
23XN4S-E	Master project 4 for study programme IS	Z	10
23XNDS-E	Master Thesis for study programme IS	Z	16
23XPXS-E	Training course for study programme IS	Z	4

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