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 4 7 Jan P ikryl Jan P ikryl Jan P ikryl (Gar.) Vehicles within ITS Z,ZK 16DITS-E 4 2P+2C Ζ Ζ Jan Leistner, Filip Kotas, David Lehet, Jaroslav Machan Geographical, information, localization and navigation systēms 20GINS-E Ζ Z,ZK 6 3P+3C Ζ Petr Bureš, František Kekula, Pavel Hrubeš, Zuzana Purkrábková Pavel Hrubeš Telematic systems and their design 20TSJ-E Ζ Z,ZK 6 3P+2C 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. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analy	I '	amentals of			
Numerical Mathematics. 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 with focus on its use and function in frame of ITS. User requirement analyses. Economic aspects. Process of constructions in a	a concept phase, i	functional			
dependences and structure of the designed object. Creation of functional models. Energy management and storages for ground vehicles, energy tra	nsformations lead	ling to kinetic			
one. Propulsion systems / traditional and alternative ones. Life-cycle analysis.					
20GINS-E Geographical, information, localization and navigation systems	Z,ZK	6			
The subject is specialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of	f transport and tele	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 technologies such as problem mapping, webmap, etc.					
20TSJ-E Telematic systems and their design	Z,ZK	6			
Gradual detailed analysis of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management, traffic management, etc.					
23TBSS-E Technology and Security of Sensor Networks	KZ	2			
The course focuses on the safety of data collection in new areas of sensor networks. Principles of sensor networks, sensors of electrical and non-electric quantities, interfaces for					
sensor connection, communication technology for sensor networks, SigFox, LoRa, NB-IoT, IoT technology and SmartCity. Trends in IoT and Smart C	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:

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

12TDP-E	Traffic Flow Theory	Z,ZK	3			
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	3			
Advanced vehicle syste	ms, electromobility, V2I and V2V, autonomous driving. Combustion engine control and electronic control units. Electric propul	sion, its compone	ents, basic			
characteristics and cont	trol. Management of hybrid propulsion for attaining its optimal efficiency. Vehicle communication bus (CAN, LIN, FlexRay etc.)	. Safety, commun	ication and			
comfort electronic vehic	le systems. Practical exercises with real and simulated systems.					
20MZZ-E	Modern techniques of safety control of moving railway vehicles	Z,ZK	3			
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 Zden k Lokaj, Tomáš Zelinka, Miroslav Vaniš Zden k Lokaj Zden k Lokaj (Gar.)	Z,ZK	6	3P+3C	L	Z
14PAM-E	Programming and modelling Vít Fábera, Tomáš Brandejský, Marek Kalika, Martin Fiala Vít Fábera Vít Fábera (Gar.)	Z,ZK	4	2P+2C	L	Z
14PD-E	Data processing Miroslav Vaniš, Martin Šrotý Michal Je ábek Michal Je ábek (Gar.)	Z,ZK	6	2P+4C	L	Z
14PPRP-E	Computer Aided Project Management Marek Kalika Marek Kalika Marek Kalika (Gar.)	KZ	2	0P+2C	L	Z
20BITS-E	Safety and reliability of ITS Systems Vladimír Faltus, Tomáš Tichý Tomáš Tichý (Gar.)	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 (- -TTS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focus	s on data exchang	e (CAM, DENM,				
IVI) 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 processing.							
14PAM-E	Programming and modelling	Z,ZK	4				
Object oriented program	nning, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, rec	ursion, complexit	y, Lindenmeyer's				
grammars, paralism in r	nature and in real systems, paralel computer systems, paralel programming, discrete simulation, models of processes, mode	l 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	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, including advanced options for							
presenting the results o	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 op	pen systems.						

14PPRP-E	Computer Aided Project Management	ΚZ	2
What is the project?	The basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specification	n of the assignme	nt, activity
definition, stages, ob	jectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of the	e project outline (activities,
restrictions, assignm	ents, calendars etc.) Project planning and optimization - time, resources.		
20BITS-E	Safety and reliability of ITS Systems	KZ	3
The basic concepts	of safety and reliability in the job and application. Basic schema and types of diagnostic systems including reliability diagnostics of	of technical equip	ment and ITS.
Investigation of acce	ptability and reliability prediction, traffic crity and sensitivity analysis. Neural Networks and other optimization algorithms and ETA	, FMEA failure a	nalysis. HMI in
traffic including oper	ator testing on simulator and in real-world situatiation		
ode of the	group: 2S-NP-IS-EN-V-21/22		
Vama of the	group: 2nd Som Mactor Full Time IS (EN) Alternative from 2021/22		

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 Jan Mejst ík Jan Mejst ík Jan Mejst ík (Gar.)	KZ	3	0P+3C	L	Z
16SHMI-E	Simulation and HMI Petr Bouchner, Stanislav Novotný, Tereza Kunclová, Michal Cenkner Stanislav Novotný (Gar.)	Z,ZK	3	2P+1C	L	Z
20ITSR-E	ITS - R Martin Leso Martin Leso (Gar.)	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	KZ	3
Basic knowledge of	raffic modeling and simulation will be broaded by the application of traffic control algorithms to traffic microsimulation models us	sed in ITS. These	nclude, for
example, the propos	I of algorithms for actuated signal control, pedestrian preference, dynamic network routing, road line traffic control, crossing secu	rity equipment, an	d PT preference
Algorithms will be de	signed, applied, and tested by students themselves.		
16SHMI-E	Simulation and HMI	Z,ZK	3
Simulation for the sy	tems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer grap	hics for ITS. Simul	ation theory with
application of comp	ting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of veh	icle dynamics on	land carriage in
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particular. Virtual rea			iano camage in
particular. Virtual rea 20ITSR-E		Z,ZK	3
20ITSR-E	ity systems.	Z,ZK	3
20ITSR-E The introduction is c	ity systems. ITS - R	Z,ZK system, principles	3 s of ensuring

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 Tomáš Tichý, Dagmar Ko árková, Josef Kocourek, Josef Filip, Ji í R ži ka 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, est	imation, prediction, filtration, control, methods of data analysis; k-means, DBSCAN, naive Baves, decision trees, support ver	tor machine.	

20AIMI-E	Application of ITS in Urban Engineering				Z,ZK	6
	nly on the issue of the installation of engineering networks in the area, coordination of engin					
1	s, design of systems for traffic and transport telematics management, coordination of trans	port modes - auto	mobil, pede	strian, MHE), cyclo, modes	s etc. New
	opment of Smart and green approaches Promoting into Public.					-
20SYIN-E	System Engineering			1	Z,ZK	6
	tion in engineering tasks, specification of selected system types against related tools of sy	•	•			
of sustainable developm	ition of system strategy, connection to science-based methodological basics of transport, s	strategic thinking p	processes, s	strategic ma	nagement syst	em, context
20HEI-E	Evaluation and Economics of ITS				KZ	3
-	devoted to the basics of system approach to development of ITS architecture and fundame	entals in the field o	of economic	1	1	-
,	e basic principles of system and application creation in the technical field are discussed, d					
The subject is terminate	d by a detailed breakdown of case studies.	0				
Code of the ar	oup: 3S-NP-IS-EN-V-21/22					
•	•	0004				
Name of the g	roup: 3rd Sem. Master Full-Time IS (EN) Alternative f	rom 2021/	22			
Requirement of	redits in the group: In this group you have to gain 3 c	redits				
	ourses in the group: In this group you have to comple		se			
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Credits in the g						
Note on the gr	oup:					
	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their	Completion	Credits	Scope	Semester	Role
Cout	members)	Completion		Coope		
	Tutors, authors and guarantors (gar.)					
16KSD-E	Quality and reliability in area of transportation means and	Z,ZK	3	2P+1C	z	z
	systems Jan Leistner, Filip Kotas, David Lehet, Jaroslav Machan	2,21	5	21 +10	<u> </u>	2
20PRZP-E	Computer aided railway traffic control	7 71/	2	2P+1C	7	7
	Dušan Kamenický Dušan Kamenický	Z,ZK	3	2P+10	۷	Z
20TVHD-E	Telematics in Public Transport	Z,ZK	3	2P+1C	Z	Z
	Patrik Horaž ovský, Milan Sliacky Milan Sliacky		Ĭ	0		-

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 probler	ns in the QFD laboratory.					
20PRZP-E	Computer aided railway traffic control	Z,ZK	3			
Introduction is devoted	o clarifying the reasons and basic principles of automation of the management of railway transport. It explains the structure of	of railway traffic m	anagement,			
including the main princ	iples applied in the management of railway traffic. The main part is devoted to detailed description of the individual compone	nts 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			
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:

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.) Master Thesis for study programme IS 11XNDS-E Ζ 0P+16C L 16 Ζ Jan P ikryl, Bohumil Ková Jan P ikryl Bohumil Ková (Gar.) 12XNDS-E Ζ 0P+16C L 16 z Master Thesis for study programme IS 14XNDS-E Ζ 0P+16C L 16 Master Thesis for study programme IS Ζ 15XNDS-E Ζ 0P+16C Master Thesis for study programme IS 16 L Ζ Master Thesis for study programme IS 16XNDS-E 0P+16C Ζ L 16 Ζ Stanislav Novotný 17XNDS-E Ζ 16 0P+16C L Master Thesis for study programme IS Ζ 18XNDS-E Ζ 0P+16C 16 L Master Thesis for study programme IS Ζ Master Thesis for study programme IS Ζ L 20XNDS-E 16 0P+16C Ζ Martin Leso

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

Master Thesis for study programme IS	Z	16
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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, Bohumil Ková, Evženie Uglickich Jan P ikryl Bohumil Ková (Gar.)	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 Josef Mik	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 Ji í R ži ka	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
Onalacteristics of the courses of this group of order i fan. code=x1 -11 -10-En-21/22 Name=1 Taxis master 1 di-Time to (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
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	Training course for study programme IS Training course for study programme IS	Training course for study programme ISZTraining course for study programme ISZ

Name of the block: Semestrální projekt Minimal number of credits of the block: 27 The role of the block: ZP

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, Bohumil Ková, Evženie Uglickich 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 Jan Leistner, David Lehet, Tereza Kunclová	Z	5	0P+4C	Z	ZP
17XN1S-E	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
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, Bohumil Ková, Evženie Uglickich Jan P ikryl Jan P ikryl (Gar.)	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 Zden k Lokai, Tomáš Zelinka, Martin Srotý	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 Jan Leistner, David Lehet, Tereza Kunclová	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
I6XN3S-E	Master project 3 for study programme IS Petr Bouchner, Na a Tylová	Z	6	0P+4C	Z	ZP
I7XN3S-E	Master project 3 for study programme IS	Z	6	0P+4C	Z	ZP
I8XN3S-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, Bohumil Ková Jan P ikryl Bohumil Ková (Gar.)	Z	10	0P+8C	L	ZP
12XN4S-E	Master project 4 for study programme IS	Z	10	0P+8C	L	ZP
I4XN4S-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 Stanislav Novotný	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 Martin Leso	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	L	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

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
	· · · ·	1	

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
15JIF1-E	Foreign Language - French 1 Irena Veselková	Z	0	0P+2C	Z	V
15JIN1-E	Foreign Language - German 1 Eva Rezlerová, Martina Navrátilová, Jana Štikarová	Z	0	0P+2C	Z	V
I5JIR1-E	Foreign Language - Russian 1 Marie Michlová	Z	0	0P+2C	Z	V
I5JIS1-E	Foreign Language - Spanish 1 Nina Hricsina Puškinová	Z	0	0P+2C	Z	V
5JIA2-E	Foreign Language - English 2 Eva Rezlerová	Z	0	0P+2C	L	V
I5JIF2-E	Foreign Language - French 2 Irena Veselková	Z	0	0P+2C	L	V
5JIN2-E	Foreign Language - German 2 Eva Rezlerová, Martina Navrátilová, Jana Štikarová	Z	0	0P+2C	L	V
5JIR2-E	Foreign Language - Russian 2 Marie Michlová	Z	0	0P+2C	L	V
5JIS2-E	Foreign Language - Spanish 2 Nina Hricsina Puškinová	Z	0	0P+2C	L	V
5JIA3-E	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
I5JIF3-E	Foreign Language - French 3 Irena Veselková	Z	0	0P+2C	Z	V
I5JIN3-E	Foreign Language - German 3 Eva Rezlerová, Martina Navrátilová, Jana Štikarová	Z	0	0P+2C	Z	V
5JIR3-E	Foreign Language - Russian 3 Marie Michlová	Z	0	0P+2C	Z	V
I5JIS3-E	Foreign Language - Spanish 3 Nina Hricsina Puškinová	Z	0	0P+2C	Z	V
15JIA4-E	Foreign Language - English 4 Eva Rezlerová	Z	0	0P+2C	L	V
15JIF4-E	Foreign Language - French 4 Irena Veselková	Z	0	0P+2C	L	V
I5JIN4-E	Foreign Language - German 4 Eva Rezlerová, Martina Navrátilová, Jana Štikarová	Z	0	0P+2C	L	V
5JIR4-E	Foreign Language - Russian 4 Marie Michlová	Z	0	0P+2C	L	V
15JIS4-E	Foreign Language - Spanish 4 Nina Hricsina Puškinová	Z	0	0P+2C	L	V
haracteristics of th	ne courses of this group of Study Plan: Code=VP-NP-IS-EN Nan	ne=Master Fu	II-Time IS	6 (EN) vo	oluntary	
Vork on specialised texts	oreign Language - English 1 and technical terminology. Lexical-grammatical structures of higher command. Formal li within students' specialization field both in verbal and written forms. Language laborate ponnections, English Library, the Internet).					
5JIF1-E F	Foreign Language - French 1 language, communication in everyday life, study, work, leiser time activities, introducing	g myself, phonetics	s of foreign l	anguage, w	Z riting skills, in a	0 advanced
1	onal topics. Toreign Language - German 1 Janguage communication in everyday life, study, work, leiser time activities, introducing	a musulf phonotion	-		Z	0

15JIA1-E	Foreign Language - English 1	Z	0
Work on specialised tex	ts and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communi	cation skills. Activ	ve use of foreign
language in presentatio	ns within students' specialization field both in verbal and written forms. Language laboratory environment used alternatively a	as a tool for active	e learning
(Programmes - English	Connections, English Library, the Internet).		
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 langu	age, writing skills	, in advanced
groups texts with profes	sional 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 langu	age, writing skills	, in advanced
groups texts with profes	sional topics.		
15JIR1-E	Foreign Language - Russian 1	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langu	age, writing skills	, in advanced
groups texts with profes	sional topics.		
15JIS1-E	Foreign Language - Spanish 1	Z	0
Basic structures of forei	gn language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langu	age, writing skills	, in advanced
groups texts with profes	sional topics.		
15JIA2-E	Foreign Language - English 2	Z	0
Work on specialised tex	ts and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communi	cation skills. Activ	ve use of foreign
language in presentation	is within students' specialization field both in verbal and written form. Language laboratory environment used alternatively as a to	ol for active learni	ng (Programmes
- English Connections,	English Library, the Internet).		
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 langu	age, writing skills	, in advanced
groups texts with profes	sional 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 langu	age, writing skills	, in advanced
groups texts with profes	sional topics.		

15JIR2-E Foreign Language - Russian 2		7	0
Basic structures of foreign language, communication in everyday life, study, we	rk, leiser time activities, introducing myself, phonetics of foreign lengu	-	
groups texts with professional topics.	in, leiser time activities, introducing mysell, phonetics of loreign langua	age, writing skills	, in auvanceu
		7	
15JIS2-E Foreign Language - Spanish 2		Z	0
Basic structures of Spanish language, communication in everyday life, study, v	ork, leisere time activities, introducing myself, phonetics of Spanish lai	nguage, writing s	
15JIA3-E Foreign Language - English 3		Z	0
Presentation skills - expert technical discourse and style. Analysis of expert te	ts and their production. Preparation for overseas work engagement. O	ptional courses f	or certificates
FCE, CAE.			
15JIF3-E Foreign Language - French 3		Z	0
Basic structures of foreign language, communication in everyday life, study, we	rk, leiser time activities, introducing myself, phonetics of foreign langu	age, writing skills	, in advanced
groups texts with professional topics.			
15JIN3-E Foreign Language - German 3		Z	0
Basic structures of foreign language, communication in everyday life, study, we	rk, leiser time activities, introducing myself, phonetics of foreign langua	age, writing skills	, in advanced
groups texts with professional topics.		0, 0	,
15JIR3-E Foreign Language - Russian 3		7	0
Basic structures of foreign language, communication in everyday life, study, we	ا hrk leiser time activities introducing myself phonetics of foreign langu	—	Ũ
groups texts with professional topics.		igo, whang orang	, in advanced
15JIS3-E Foreign Language - Spanish 3		7	0
Basic structures of foreign language, communication in everyday life, study, we	 http://www.leiser.time.activities_introducing.myself_nhonetics.of.foreign.langu	—	-
groups texts with professional topics.	in, leiser unte activities, introducing mysen, phonetics of foleign langua	age, writing skins	, in advanced
15JIA4-E Foreign Language - English 4		7	0
Presentation Skills - expert technical discourse and style. Analysis of expert technical	 vis and their production Proparation for overseas work engagement (—	-
FCE, CAE.	the and their production. Preparation for overseas work engagement. C	ptional courses	IOI CELINCALES
		7	0
15JIF4-E Foreign Language - French 4		Z	0
Basic structures of foreign language, communication in everyday life, study, we	ork, leiser time activities, introducing myself, phonetics of foreign langua	age, writing skills	, in advanced
groups texts with professional topics.		_	
15JIN4-E Foreign Language - German 4		Z	0
Basic structures of foreign language, communication in everyday life, study, we	ork, leiser time activities, introducing myself, phonetics of foreign langua	age, writing skills	, in advanced
groups texts with professional topics.			
15JIR4-E Foreign Language - Russian 4		Z	0
Basic structures of foreign language, communication in everyday life, study, we	ork, leiser time activities, introducing myself, phonetics of foreign langua	age, writing skills	, in advanced
groups texts with professional topics.			
15JIS4-E Foreign Language - Spanish 4		Z	0
Basic structures of foreign language, communication in everyday life, study, we	rk, leiser time activities, introducing myself, phonetics of foreign langua	age, writing skills	, in advanced
groups texts with professional topics.		-	

List of courses of this pass:

Code	Name of the course	Completion	Credits
11MAI-E	ITS Mathematical Tools	Z,ZK	4
Series, Fourier Seri	ies. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier A	nalysis to PDE. Fundar	nentals of
Num	erical Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following	models as ODEs.	
11MMAD-E	Mathematical Methods for Data Analysis	Z,ZK	6
Stocastic m	nodelling, estimation, prediction, filtration, control, methods of data analysis: k-means, DBSCAN, naive Bayes, decision trees,	support vector machine	e.
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 associate	ed human problems. Basic traffic parameters and their measurement. Estimation of quality of services. Theoretical fundamenta	Is and applications of m	athematica
models. Macroscopic,	, statistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation	n between traffic model	s and traffi
1	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
Detailed description of	f C-ITS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focu	is on data exchange (C	AM, DENN
IVI) and C-ITS securit	ty architecture. Status quo and modern trends of wireless telecommunication solutions ITS-G5 and LTE-V and description of i	ts properties and speci	fics. Cours
	will also cover signal processing.		

14MIM-E	Microsimulation Models	KZ	3
Basic knowledge	of traffic modeling and simulation will be broaded by the application of traffic control algorithms to traffic microsimulation models us	ed in ITS. These ir	clude, for
xample, the propo	sal of algorithms for actuated signal control, pedestrian preference, dynamic network routing, road line traffic control, crossing security	equipment, and PT	r preferenc
	Algorithms will be designed, applied, and tested by students themselves.		
14PAM-E	Programming and modelling	Z.ZK	4
	gramming, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, recurs	1 '	ndenmeve
•	n in nature and in real systems, paralel computer systems, paralel programming, discrete simulation, models of processes, model ty		-
	of analytical sources for modelling, BPMN language, SW Bizagi, model creation and life cycle.		,
14PD-E	Data processing about tools for data processing and analysis, using practical examples to try out the most common options used in data processing,	Z,ZK	6 d ontions
	Its of analyses. In advanced methods, students will also perform specific analysis using Bayesian networks. Students will then indep	-	-
esenting the rest	on data from existing open systems.	endenny penorin (iala analy
14PPRP-E	Computer Aided Project Management	KZ	2
	ect? The basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specificatio		
	s, objectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of the		
deminion, stage	restrictions, assignments, calendars etc.) Project planning and optimization - time, resources.		activities,
14XN1S-E		7	5
	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	Z	16
14XPXS-E	Training course for study programme IS	Z	4
15JIA1-E	Foreign Language - English 1	Z	0
	texts and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communica	1	-
-	sentations within students' specialization field both in verbal and written forms. Language laboratory environment used alternatively		
language in pre	(Programmes - English Connections, English Library, the Internet).	as a tool for active	leanning
		7	0
15JIA2-E	Foreign Language - English 2	Z	0
	d texts and technical terminology. Lexical-grammatical structures of higher command. Formal language. Improvement of communica		
nguage in present	ations within students' specialization field both in verbal and written form. Language laboratory environment used alternatively as a tool f - English Connections, English Library, the Internet).	or active learning (Programm
		-	
15JIA3-E	Foreign Language - English 3	Z	0
Presentation skills	s - expert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement. Op	otional courses for	certificate
	FCE, CAE.		
15JIA4-E	Foreign Language - English 4	Z	0
Presentation Skill	s - expert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement. Op	otional courses for	certificate
	FCE, CAE.		
15JIF1-E	Foreign Language - French 1	Z	0
Basic structures o	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	n advance
	groups texts with professional topics.		
15JIF2-E	Foreign Language - French 2	Z	0
Basic structures o	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	advance
	groups texts with professional topics.		
15JIF3-E	Foreign Language - French 3	Z	0
Basic structures of	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	, ge, writing skills, ir	advance
	groups texts with professional topics.		
15JIF4-E	Foreign Language - French 4	Z	0
	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	-
	groups texts with professional topics.		
15JIN1-E	Foreign Language - German 1	Z	0
	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	1	-
	groups texts with professional topics.		
15JIN2-E	Foreign Language - German 2	Z	0
	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	-	-
	groups texts with professional topics.	yo, whiting skills, ll	
		Z	0
15JIN3-E	Foreign Language - German 3	-	-
มสอเปอเเนเยร์ (f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua groups texts with professional topics.	ye, whung skills, if	auvance
		7	
15JIN4-E	Foreign Language - German 4	Z	0
Dasic structures o	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	i advance
	groups texts with professional topics.	-	-
15JIR1-E	Foreign Language - Russian 1	Z	0
Basic structures c	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	n advance
	groups texts with professional topics.		
	Foreign Language - Russian 2	Z	0
15JIR2-E	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign langua	ge, writing skills, ir	n advance
Basic structures c	groups texts with professional topics.		
		Z	0
Basic structures c	groups texts with professional topics.	-	-

	Foreign Lenguage Duration 4	7	<u>^</u>
15JIR4-E Basic structures of	Foreign Language - Russian 4	Z e. writing skills. ir	0 advanced
_ 2010 011 0010100 (groups texts with professional topics.	-,iy okiio, li	
15JIS1-E	Foreign Language - Spanish 1	Z	0
Basic structures of	of foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language	e, writing skills, ir	advanced
15 IISO E	groups texts with professional topics.	Z	0
15JIS2-E Basic structu	Foreign Language - Spanish 2 res of Spanish language, communication in everyday life, study, work, leisere time activities, introducing myself, phonetics of Spanish	_	0 a skills.
15JIS3-E	Foreign Language - Spanish 3	Z	0
Basic structures of	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language groups texts with professional topics.	e, writing skills, ir	advanced
15JIS4-E	Foreign Language - Spanish 4	Z	0
Basic structures of	f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language groups texts with professional topics.	e, writing skills, ir	n advanced
15XN1S-E	Master project 1 for study programme IS	Z	5
15XN2S-E	Master project 1 for study programme IS	Z	6
15XN3S-E	Master project 2 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
Design of the ve	shicle with focus on its use and function in frame of ITS. User requirement analyses. Economic aspects. Process of constructions in a	concept phase, f	
dependences and	d structure of the designed object. Creation of functional models. Energy management and storages for ground vehicles, energy transf	ormations leadin	g to kinetic
	one. Propulsion systems / traditional and alternative ones. Life-cycle analysis.	7 71/	2
16ESDP-E	Electronic systems in modern vehicles	Z,ZK	3
	nd control. Management of hybrid propulsion for attaining its optimal efficiency. Vehicle communication bus (CAN, LIN, FlexRay etc.). S		
	comfort electronic vehicle systems. Practical exercises with real and simulated systems.	•	
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. Methods for available and exact the local methods for available to the local methods for available to the local methods.		
process design an	d quality improvement (Six Sigma etc.). Certification and accreditation, quality management, tools and methods for quality stabilization	and improveme	nt. Students
	Will work on real problems in the CEL J Japoratory		
16SHMI-E	will work on real problems in the QFD laboratory.	7 7K	3
16SHMI-E Simulation for the s	Simulation and HMI	Z,ZK or ITS. Simulation	3 n theory with
Simulation for the s		or ITS. Simulation	n theory wit
Simulation for the s application of comp	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics fo puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle of particular. Virtual reality systems.	or ITS. Simulation	n theory wit d carriage i
imulation for the s pplication of comp 16XN1S-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle of particular. Virtual reality systems. Master project 1 for study programme IS	or ITS. Simulation dynamics, on-lan Z	n theory wit d carriage in 5
Simulation for the s application of comp 16XN1S-E 16XN2S-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle of particular. Virtual reality systems. Master project 1 for study programme IS Master project 2 for study programme IS	or ITS. Simulation dynamics, on-lan Z Z	n theory with d carriage ir 5 6
Simulation for the s application of comp 16XN1S-E 16XN2S-E 16XN3S-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle of particular. Virtual reality systems. Master project 1 for study programme IS Master project 2 for study programme IS Master project 3 for study programme IS	or ITS. Simulation dynamics, on-lan Z Z Z	theory wit d carriage in 5 6 6
Simulation for the s application of comp 16XN1S-E 16XN2S-E 16XN3S-E 16XN4S-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for buting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle of particular. Virtual reality systems. Master project 1 for study programme IS Master project 2 for study programme IS Master project 3 for study programme IS Master project 4 for study programme IS Master project 4 for study programme IS	or ITS. Simulatio dynamics, on-lan Z Z Z Z	n theory with d carriage ir 5 6 6 10
Simulation for the s application of comp 16XN1S-E 16XN2S-E 16XN3S-E 16XN4S-E 16XNDS-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle or particular. Virtual reality systems. Master project 1 for study programme IS Master project 2 for study programme IS Master project 3 for study programme IS Master project 4 for study programme IS Master Thesis for study programme IS Master Thesis for study programme IS	or ITS. Simulatio dynamics, on-lan Z Z Z Z Z Z	h theory with d carriage in 5 6 6 6 10 10
imulation for the s application of comp 16XN1S-E 16XN2S-E 16XN3S-E 16XN4S-E 16XNDS-E 16XPXS-E	Simulation and HMI ystems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for puting equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle or particular. Virtual reality systems. Master project 1 for study programme IS Master project 2 for study programme IS Master project 3 for study programme IS Master project 4 for study programme IS Master Thesis for study programme IS Training course for study programme IS	or ITS. Simulatio dynamics, on-lan Z Z Z Z Z Z Z Z	n theory with d carriage in 5 6 6 10 10 16 4
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20HEI-E	Evaluation and Economics of ITS	KZ	3
ntroduction of subje	ect is devoted to the basics of system approach to development of ITS architecture and fundamentals in the field of economic attribute	s connected with o	developmer
of ITS. Subsequer	htly, the basic principles of system and application creation in the technical field are discussed, defining the penetration of the technic	al solution into the	e economy.
	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		-
unctional and secu	rity features are defined. The principles of ERTMS / ETCS application level 3, UGTMS, CBTC are discussed in detail. Current and future are described.	ecommunication	echnologie
20MZZ-E	Modern techniques of safety control of moving railway vehicles	Z,ZK	3
	concepts, ETCS architecture and interface descriptions, ERTMS system level, infrastructure and mobile part of the system, linking to		1
	cation modes of the system, infrastructure orientation, interface (DMI), integration of the ETCS mobile part into the driving vehicle, G		-
	testing and legislation.		
20PRZP-E	Computer aided railway traffic control	Z,ZK	3
Introduction is de	voted to clarifying the reasons and basic principles of automation of the management of railway transport. It explains the structure of	railway traffic mar	hagement,
ncluding 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, wh	ich must b
	included in the systems for automation of railway traffic control using computer technologies.		
20SYIN-E	System Engineering	Z,ZK	6
-	definition in engineering tasks, specification of selected system types against related tools of system analysis and design, refinement		-
ngineering tasks,	definition of system strategy, connection to science-based methodological basics of transport, strategic thinking processes, strategic	management sys	tem, conte
	of sustainable development.	7 71/	0
20TSJ-E	Telematic systems and their design	Z,ZK	6
20TVHD-E	ed analysis of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management		1
	Telematics in Public Transport nation systems; foreinght experiences; vehicle technology; dispatching systems; Information Systems; data structures; clearing; Public	Z,ZK	3
icketing and inform	position monitoring; legislative framework; standardization, certification and interoperability.	nansport preierei	ices, veriic
20XN1S-E	Master project 1 for study programme IS	Z	5
20XN2S-E		Z	6
	Master project 2 for study programme IS	Z	6
20XN3S-E	Master project 3 for study programme IS	Z	-
20XN4S-E	Master project 4 for study programme IS		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
	es on the safety of data collection in new areas of sensor networks. Principles of sensor networks, sensors of electrical and non-elec		1
	sor connection, communication technology for sensor networks, SigFox, LoRa, NB-IoT, IoT technology and SmartCity. Trends in IoT a		
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 2 for study programme IS	Z	6
23XN4S-E	Master project 4 for study programme IS	Z	10
2371143-E	6 I (Z	10
23XNDS-E 23XPXS-E	Master Thesis for study programme IS Training course for study programme IS	Z	4

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