Study plan

Name of study plan: Master Full-Time IS (CS) from 2024/25

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: 76 Elective courses credits: 44 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses Minimal number of credits of the block: 49 The role of the block: Z

Code of the group: 1S-NP-IS-CS-24/25 Name of the group: 1st Sem. Master Full-Time IS (CS) from 2024/25 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 Z,ZK 2P+2C 7 4 7 Jan P ikryl Jan P ikryl Jan P ikryl (Gar.) Vehicles within ITS 16DITS Z,ZK 4 2P+2C Ζ Ζ Jan Leistner, Filip Kotas, David Lehet, Jaroslav Machan Geographical, information, localization and navigation systēms 20GINS 7 Z,ZK 6 3P+3C Ζ Pavel Hrubeš, Petr Bureš, Zuzana Purkrábková, František Kekula Pavel Hrubeš Telematic systems and their design 20TSJ Z,ZK 6 3P+2C Ζ Ζ Pavel Hrubeš, Martin Langr Martin Langr **Technology and Security of Sensor Networks** 20TBSS ΚZ 2 2P+0C Ζ Ζ Zden k Lokaj, Tomáš Tichý, Miroslav Vaniš, Ji í Brož Zden k Lokaj Zden k Lokaj (Gar.)

Characteristics of the courses of this group of Study Plan: Code=1S-NP-IS-CS-24/25 Name=1st Sem. Master Full-Time IS (CS) from 2024/25

| 11MAI | ITS Mathematical Tools | Z,ZK | 4 | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|--|--|--|--|
| Series, Fourier Series. I | Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analy | sis to PDE. Fund | amentals of | | | | |
| Numerical Mathematics | Numerical Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following models as ODEs. | | | | | | |
| 16DITS | 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 concept phase, functional | | | | | | | |
| dependences and struc | ture of the designed object. Creation of functional models. Energy management and storages for ground vehicles, energy tra | nsformations lead | ling to kinetic | | | | |
| one. Propulsion system | s / traditional and alternative ones. Life-cycle analysis. | | | | | | |
| 20GINS | Geographical, information, localization and navigation systems | Z,ZK | 6 | | | | |
| The subject is specialize | d in problems of work with applications of geographic information systems with special attention to the specialization in the field o | f transport and tele | ecommunication. | | | | |
| It introduces students to | o 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 tec | hnologies such as problem mapping, webmap, etc. | | | | | | |
| 20TSJ | Telematic systems and their design | Z,ZK | 6 | | | | |
| Gradual detailed analys | is of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management, | traffic manageme | ent, etc. | | | | |
| 20TBSS | Technology and Security of Sensor Networks | KZ | 2 | | | | |
| Basic concepts of safety and reliability in transport and its application. Basic scheme and types of diagnostic systems, including reliability diagnostics of technological equipment and | | | | | | | |
| ITS. Investigation of the | ITS. Investigation of the area of acceptability and prediction of reliability, sensitivity in transport and sensitivity analysis. Neural networks and other optimization algorithms and fault | | | | | | |
| analysis ETA, FMEA. H | MI in transport, including operator testing on a simulator and in real situations. | | | | | | |

Name of the group: 1st Sem. Master Full-Time IS (CS) Alternative from 2020/21 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:

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.) **Traffic Flow Theory** 12TDP Z,ZK 3 2P+1C Ζ Ζ Vladimír Faltus Electronic systems in modern vehicles Ζ 16ESDP Z,ZK 3 2P+1C Ζ Petr Bouchner, Dmitrij Rožd stvenský Modern techniques of safety control of moving railway Ζ 20MZZ Z,ZK 3 2P+1C Ζ vehicles Martin Leso Martin Leso

Characteristics of the courses of this group of Study Plan: Code=1S-NP-IS-CS-V-20/21 Name=1st Sem. Master Full-Time IS (CS) Alternative from 2020/21

| 12TDP | 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, s | 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 | 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 | nts, basic | | | | |
| characteristics and cont | rol. Management of hybrid propulsion for attaining its optimal efficiency. Vehicle communication bus (CAN, LIN, FlexRay etc.) | . Safety, communi | ication and | | | | |
| comfort electronic vehic | le systems. Practical exercises with real and simulated systems. | | | | | | |
| 20MZZ | 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 | 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-CS-20/21

Name of the group: 2nd Sem. Master Full-Time IS (CS) from 2020/21 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 | C-ITS Systems Zden k Lokaj, Miroslav Vaniš, Tomáš Zelinka Zden k Lokaj Zden k Lokaj (Gar.) | Z,ZK | 6 | 3P+3C | L | Z |
| 14PAM | Programming and modelling Vít Fábera, Tomáš Brandejský, Marek Kalika, Martin Fiala Vít Fábera Vít Fábera (Gar.) | Z,ZK | 4 | 2P+2C | L | Z |
| 14PD | Data processing Miroslav Vaniš, Martin Šrotý, Michal Je ábek Martin Šrotý Martin Šrotý (Gar.) | Z,ZK | 6 | 2P+4C | L | Z |
| 14PPRP | Computer Aided Project Management Marek Kalika Marek Kalika Marek Kalika (Gar.) | KZ | 2 | 0P+2C | L | Z |
| 20BITS | Safety and reliability of ITS Systems Tomáš Tichý, Vladimír Faltus | KZ | 3 | 2P+1C | L | Z |

Characteristics of the courses of this group of Study Plan: Code=2S-NP-IS-CS-20/21 Name=2nd Sem. Master Full-Time IS (CS) from 2020/21

| 14CITS C-ITS Systems | Z,ZK | 6 | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------|--|--|--|
| Detailed description of C-ITS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focus | 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 Programming and modelling | Z,ZK | 4 | | | |
| Object oriented programming, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, rec | ursion, complexity | y, 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 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 of analyses. In advanced methods, students will also perform specific analysis using Bayesian networks. Students will then ind | ependently perfor | rm data analysis | | | |
| on data from existing open systems. | | | | | |

| 14PPRP | Computer Aided Project Management | KZ | 2 | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|--|--|--|
| What is the project? The | Vhat 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, object | definition, stages, objectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of the project outline (activities, | | | | | |
| restrictions, assignment | s, calendars etc.) Project planning and optimization - time, resources. | | | | | |
| 20BITS | Safety and reliability of ITS Systems | KZ | 3 | | | |
| The basic concepts of s | afety and reliability in the job and application. Basic schema and types of diagnostic systems including reliability diagnostics | of technical equip | ment 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 operato | raffic including operator testing on simulator and in real-world situatiation | | | | | |

Code of the group: 2S-NP-IS-CS-V-20/21

Name of the group: 2nd Sem. Master Full-Time IS (CS) Alternative from 2020/21 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 | Microsimulation Models Jan Kr ál Jan Kr ál Jan Kr ál (Gar.) | КZ | 3 | 0P+3C | L | Z |
| 16SHMI | Simulation and HMI Stanislav Novotný, Tereza Kunclová, Michal Cenkner | Z,ZK | 3 | 2P+1C | L | Z |
| 20ITSR | 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-CS-V-20/21 Name=2nd Sem. Master Full-Time IS (CS) Alternative from 2020/21

| 14MIM | Microsimulation Models | KZ | 3 | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|--|--|--|--|
| Basic knowledge of traf | 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 desig | ned, applied, and tested by students themselves. | | | | | | |
| 16SHMI | Simulation and HMI | Z,ZK | 3 | | | | |
| Simulation for the syste | ns in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graph | nics for ITS. Simul | ation theory with | | | | |
| application of computing | g equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehi | cle dynamics, on | -land carriage in | | | | |
| particular. Virtual reality | systems. | | | | | | |
| 20ITSR | ITS - R | Z,ZK | 3 | | | | |
| The introduction is devo | ted to description of the architecture and interface of the system with the ITS-R concept, the communication interface of the | system, principles | s 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. | | | | | | | |
| | | | | | | | |

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-CS-20/21 Name of the group: Research Groups Master Full-Time IS (CS) from 2020/21 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 | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 12XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 14XN1S | Master project 1 for study programme IS Zden k Lokaj, Tomáš Zelinka, Martin Šrotý | Z | 5 | 0P+4C | Z | ZP |
| 15XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 16XN1S | Master project 1 for study programme IS Josef Mík, Milan Sliacky | Z | 5 | 0P+4C | Z | ZP |
| 17XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 18XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |

| 20XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
|--------|---------------------------------------------------------------------------------------------------------------|---|----|-------|-------|----|
| 21XN1S | Pavel Hrubeš, Ji í Brož, Martin Leso, Ji í R ži ka Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 22XN1S | Master project 1 for study programme IS | Z | 5 | 0P+4C | Z | ZP |
| 11XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 12XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| - | Master project 2 for study programme IS | Z | - | | | |
| 14XN2S | Vít Fábera Vít Fábera (Gar.) | | 6 | 0P+4C | L | ZP |
| 15XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 16XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 17XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 18XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 20XN2S | Master project 2 for study programme IS Martin Leso, Ji í R ži ka | Z | 6 | 0P+4C | L | ZP |
| 21XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 22XN2S | Master project 2 for study programme IS | Z | 6 | 0P+4C | L | ZP |
| 11XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 12XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 14XN3S | Master project 3 for study programme IS Zden k Lokaj, Tomáš Zelinka, Vít Fábera, Martin Šrotý | Z | 6 | 0P+4C | Z | ZP |
| 15XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 16XN3S | Master project 3 for study programme IS Petr Bouchner, Josef Mík, Dmitry Rozhdestvenskiy | Z | 6 | 0P+4C | Z | ZP |
| 17XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 18XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 20XN3S | Master project 3 for study programme IS Martin Leso, Milan Sliacky, Ji í R ži ka | Z | 6 | 0P+4C | Z | ZP |
| 21XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 22XN3S | Master project 3 for study programme IS | Z | 6 | 0P+4C | Z | ZP |
| 11XN4S | Master project 4 for study programme IS | Z | 10 | 0P+8C | L | ZP |
| 12XN4S | Master project 4 for study programme IS | Z | 10 | 0P+8C | L | ZP |
| 14XN4S | Master project 4 for study programme IS Zden k Lokaj, Tomáš Zelinka, Vít Fábera, Martin Šrotý, Jan Zelenka | Z | 10 | 0P+8C | L | ZP |
| 15XN4S | Master project 4 for study programme IS | Z | 10 | 0P+8C | L | ZP |
| 16XN4S | Master project 4 for study programme IS Petr Bouchner, Stanislav Novotný, Josef Mík | Z | 10 | 0P+8C | L | ZP |
| 17XN4S | Master project 4 for study programme IS | Z | 10 | 0P+8C | L | ZP |
| 18XN4S | Master project 4 for study programme IS Nela Kr má ová | Z | 10 | 0P+8C | L | ZP |
| 20XN4S | Master project 4 for study programme IS Martin Leso, Milan Sliacky, Ji í R ži ka | Z | 10 | 0P+8C | L | ZP |
| 21XN4S | Master project 4 for study programme IS | Z | 10 | 0P+8C | L | ZP |
| 22XN4S | 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-CS-20/21 Name=Research Groups Master Full-Time IS (CS) from 2020/21

| 11XN1S | Master project 1 for study programme IS | Z | 5 |
|--------|-----------------------------------------|---|---|
| 12XN1S | Master project 1 for study programme IS | Z | 5 |
| 14XN1S | Master project 1 for study programme IS | Z | 5 |
| 15XN1S | Master project 1 for study programme IS | Z | 5 |
| 16XN1S | Master project 1 for study programme IS | Z | 5 |
| 17XN1S | Master project 1 for study programme IS | Z | 5 |
| 18XN1S | Master project 1 for study programme IS | Z | 5 |
| 20XN1S | Master project 1 for study programme IS | Z | 5 |
| 21XN1S | Master project 1 for study programme IS | Z | 5 |
| 22XN1S | Master project 1 for study programme IS | Z | 5 |
| 11XN2S | Master project 2 for study programme IS | Z | 6 |
| 12XN2S | Master project 2 for study programme IS | Z | 6 |
| 14XN2S | Master project 2 for study programme IS | Z | 6 |
| 15XN2S | Master project 2 for study programme IS | Z | 6 |
| 16XN2S | Master project 2 for study programme IS | Z | 6 |
| 17XN2S | Master project 2 for study programme IS | Z | 6 |
| 18XN2S | Master project 2 for study programme IS | Z | 6 |

| 20XN2S | Master project 2 for study programme IS | Z | 6 |
|--------|-----------------------------------------|---|----|
| 21XN2S | Master project 2 for study programme IS | Z | 6 |
| 22XN2S | Master project 2 for study programme IS | Z | 6 |
| 11XN3S | Master project 3 for study programme IS | Z | 6 |
| 12XN3S | Master project 3 for study programme IS | Z | 6 |
| 14XN3S | Master project 3 for study programme IS | Z | 6 |
| 15XN3S | Master project 3 for study programme IS | Z | 6 |
| 16XN3S | Master project 3 for study programme IS | Z | 6 |
| 17XN3S | Master project 3 for study programme IS | Z | 6 |
| 18XN3S | Master project 3 for study programme IS | Z | 6 |
| 20XN3S | Master project 3 for study programme IS | Z | 6 |
| 21XN3S | Master project 3 for study programme IS | Z | 6 |
| 22XN3S | Master project 3 for study programme IS | Z | 6 |
| 11XN4S | Master project 4 for study programme IS | Z | 10 |
| 12XN4S | Master project 4 for study programme IS | Z | 10 |
| 14XN4S | Master project 4 for study programme IS | Z | 10 |
| 15XN4S | Master project 4 for study programme IS | Z | 10 |
| 16XN4S | Master project 4 for study programme IS | Z | 10 |
| 17XN4S | Master project 4 for study programme IS | Z | 10 |
| 18XN4S | Master project 4 for study programme IS | Z | 10 |
| 20XN4S | Master project 4 for study programme IS | Z | 10 |
| 21XN4S | Master project 4 for study programme IS | Z | 10 |
| 22XN4S | 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-CS Name of the group: Master Full-Time IS (CS) 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 | Foreign Language - English 1 Markéta Musilová, Dana Boušová, Jitka He manová, Marie Michlová, Lenka Monková, Peter Morpuss, Eva Rezlerová | Z | 0 | 0P+2C | Z | V |
| 15JIF1 | Foreign Language - French 1 Irena Veselková | Z | 0 | 0P+2C | Z | V |
| 15JIN1 | Foreign Language - German 1 Eva Rezlerová, Martina Navrátilová, Jana Štikarová | Z | 0 | 0P+2C | Z | V |
| 15JIR1 | Foreign Language - Russian 1 Marie Michlová | Z | 0 | 0P+2C | Z | V |
| 15JIS1 | Foreign Language - Spanish 1 Nina Hricsina Puškinová | Z | 0 | 0P+2C | Z | V |
| 15JIA2 | Foreign Language - English 2 Eva Rezlerová | Z | 0 | 0P+2C | L | V |
| 15JIF2 | Foreign Language - French 2 Irena Veselková | Z | 0 | 0P+2C | L | V |
| 15JIN2 | Foreign Language - German 2 Eva Rezlerová, Martina Navrátilová, Jana Štikarová | Z | 0 | 0P+2C | L | V |
| 15JIR2 | Foreign Language - Russian 2 Marie Michlová | Z | 0 | 0P+2C | L | V |
| 15JIS2 | Foreign Language - Spanish 2 Nina Hricsina Puškinová | Z | 0 | 0P+2C | L | V |
| 15JIA3 | Foreign Language - English 3 Markéta Musilová, Dana Boušová, Jitka He manová, Marie Michlová, Lenka Monková, Peter Morpuss, Eva Rezlerová, Markéta Vojanová | Z | 0 | 0P+2C | Z | V |
| 15JIF3 | Foreign Language - French 3 Irena Veselková | Z | 0 | 0P+2C | Z | V |
| 15JIN3 | Foreign Language - German 3 Eva Rezlerová, Martina Navrátilová, Jana Štikarová | Z | 0 | 0P+2C | Z | V |
| 15JIR3 | Foreign Language - Russian 3 Marie Michlová | Z | 0 | 0P+2C | Z | V |

| 15JIS3 | Foreign Language - Spanish 3 Nina Hricsina Puškinová | Z | 0 | 0P+2C | Z | V | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------|------------------|--------------------------|------------------|--|
| 15JIA4 | Foreign Language - English 4 Eva Rezlerová | Z | 0 | 0P+2C | L | V | |
| 15JIF4 | Foreign Language - French 4 Irena Veselková | Z | 0 | 0P+2C | L | V | |
| 15JIN4 | Foreign Language - German 4 Eva Rezlerová, Martina Navrátilová, Jana Štikarová | Z | 0 | 0P+2C | L | V | |
| 15JIR4 | Foreign Language - Russian 4 Marie Michlová | Z | 0 | 0P+2C | L | V | |
| 15JIS4 | Foreign Language - Spanish 4 Nina Hricsina Puškinová | Z | 0 | 0P+2C | L | V | |
| Characteristics of the | courses of this group of Study Plan: Code=VP-NP-IS-CS Name | e=Master Ful | I-Time IS | 6 (CS) vo | luntary | | |
| | eign Language - English 1 | | | | Z | 0 | |
| | d technical terminology. Lexical-grammatical structures of higher command. Formal lau thin students' specialization field both in verbal and written forms. Language laborator | | | | | | |
| | nections, English Library, the Internet). | - | | | | _ | |
| | reign Language - French 1 | mucalf phonotics | of foreign l | | | 0 | |
| groups texts with professiona | nguage, communication in everyday life, study, work, leiser time activities, introducing al topics. | mysell, phonetics | or loreign i | anguage, wi | iung skills, in | auvanceu | |
| | reign Language - German 1 | | | | Z | 0 | |
| • | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | riting skills, in | advanced | |
| groups texts with professional topics. | | | | | | | |
| | reign Language - Russian 1 nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | - 1 | - | |
| groups texts with professiona | al topics. | , ,, | 0 | 0 0 / | | | |
| | reign Language - Spanish 1 | | | | Z | 0 | |
| Basic structures of foreign la groups texts with professiona | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | riting skills, in | advanced | |
| | reign Language - English 2 | | | | Z | 0 | |
| Work on specialised texts an | d technical terminology. Lexical-grammatical structures of higher command. Formal la | | | | | | |
| | hin students' specialization field both in verbal and written form. Language laboratory env | vironment used alt | ernatively as | s a tool for ac | ctive learning (| Programmes | |
| - English Connections, English 15JIF2 For | reign Language - French 2 | | | | 7 | 0 | |
| | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | ı anguage, wı | | - | |
| groups texts with professiona | | | | | | | |
| | reign Language - German 2 nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | Z riting skills, in | 0 advanced | |
| groups texts with professiona | | | | | - | | |
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| groups texts with professiona | | mysen, phonenes | of loreign a | anguage, wi | ning skins, in | advanced | |
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| | reign Language - English 3 echnical discourse and style. Analysis of expert texts and their production. Preparation | for overseas work | (engageme | nt Optional | Z courses for c | 0 ertificates | |
| FCE, CAE. | | | tongagome | ina optiona | | ortinoutoo | |
| | reign Language - French 3 | | | | Z | 0 | |
| Basic structures of foreign la groups texts with professiona | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | riting skills, in | advanced | |
| | reign Language - German 3 | | | | Z | 0 | |
| | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | 1 | - | |
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| | reign Language - Russian 3 nguage, communication in everyday life, study, work, leiser time activities, introducing | myself phonetics | of foreign l | anguage wi | Z | 0 advanced | |
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| 15JIS3 For | reign Language - Spanish 3 | | | | Z | 0 | |
| - | nguage, communication in everyday life, study, work, leiser time activities, introducing | myself, phonetics | of foreign la | anguage, wi | riting skills, in | advanced | |
| groups texts with professional topics. 15JIA4 Foreign Language - English 4 Z 0 | | | | | | | |
| Presentation Skills - expert technical discourse and style. Analysis of expert texts and their production. Preparation for overseas work engagement. Optional courses for certificates | | | | | | | |
| FCE, CAE. | | | | | | | |
| | reign Language - French 4 nguage communication in everyday life study work leiser time activities introducing. | myself phonetics | of foreign ¹ | anguage w | Z riting skills in | 0 advanced | |
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| groups texts with professional topics. 15JIR4 Foreign Language - Russian 4 Z 0 | | | | | | | |
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| groups texts with professiona | | | - | | | | |

List of courses of this pass:

| | Name of the course | Completion | Credits |
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| 11MAI | ITS Mathematical Tools | Z,ZK | 4 |
| Series, Fourier Series. | Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier An | alysis to PDE. Fundam | nentals of |
| | cal Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following r | models as ODEs. | |
| 11XN1S | Master project 1 for study programme IS | Z | 5 |
| 11XN2S | Master project 2 for study programme IS | Z | 6 |
| 11XN3S | Master project 3 for study programme IS | Z | 6 |
| 11XN4S | Master project 4 for study programme IS | Z | 10 |
| 12TDP | Traffic Flow Theory | Z,ZK | 3 |
| Mobility and associated h | numan problems. Basic traffic parameters and their measurement. Estimation of quality of services. Theoretical fundamentals | s and applications of m | athematica |
| models. Macroscopic, st | atistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation | between traffic models | s and traffic |
| | flow management. | | |
| 12XN1S | Master project 1 for study programme IS | Z | 5 |
| 12XN2S | Master project 2 for study programme IS | Z | 6 |
| 12XN3S | Master project 3 for study programme IS | Z | 6 |
| 12XN4S | Master project 4 for study programme IS | Z | 10 |
| 14CITS | C-ITS Systems | Z,ZK | 6 |
| Detailed description of C | ITS systems architecture, description of use-cases - urban and rural applications, principles of C-ITS funcionality with focus | s on data exchange (C | AM, DENN |
| IVI) and C-ITS security a | rchitecture. Status quo and modern trends of wireless telecommunication solutions ITS-G5 and LTE-V and description of it | s properties and specifies | fics. Course |
| | will also cover signal processing. | | |
| 14MIM | Microsimulation Models | KZ | 3 |
| - | affic modeling and simulation will be broaded by the application of traffic control algorithms to traffic microsimulation models | | |
| example, the proposal of | algorithms for actuated signal control, pedestrian preference, dynamic network routing, road line traffic control, crossing secu | rity equipment, and PT | preference |
| | Algorithms will be designed, applied, and tested by students themselves. | 7 71/ | 4 |
| 14PAM | Programming and modelling | Z,ZK | 4 |
| | ning, dynamic memory allocation, inheritage, generic programming, STL, abstract data types, programming techniques, rec ature and in real systems, paralel computer systems, paralel programming, discrete simulation, models of processes, mode | | - |
| grammars, paransmini | of analytical sources for modelling, BPMN language, SW Bizagi, model creation and life cycle. | ei types As-is a 10-be, | acquisition |
| 14PD | Data processing | Z,ZK | 6 |
| I | tools for data processing and analysis, using practical examples to try out the most common options used in data processi | | - |
| | analyses. In advanced methods, students will also perform specific analysis using Bayesian networks. Students will then inc | | - |
| 1 5 | on data from existing open systems. | | ····,· |
| 14PPRP | | | |
| | Computer Aided Project Management | K7 | 2 |
| | Computer Aided Project Management he basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specifica | KZ ation of the assignmen | 2 t, activity |
| What is the project? T | | ation of the assignmen | t, activity |
| What is the project? T | he basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specification | ation of the assignmen | t, activity |
| What is the project? T | he basic terms a concepts of project management. Life cycle of the project and its phased approach. Analysis and specificat ectives and measurability. Risk events and risk planning. Project change management during implementation. Preparation of restrictions, assignments, calendars etc.) Project planning and optimization - time, resources. | ation of the assignmen | t, activity |
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| Basic structures o | groups texts with professional topics. | je, whung skills, i | n auvanceu |
| 15JIF3 | Foreign Language - French 3 | Z | 0 |
| | foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | _ | - |
| | groups texts with professional topics. | | |
| 15JIF4 | Foreign Language - French 4 | Z | 0 |
| Basic structures c | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advanced |
| | groups texts with professional topics. | | - |
| 15JIN1 | Foreign Language - German 1 | Z | 0 |
| Basic structures o | of foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advanced |
| | groups texts with professional topics. | 7 | 0 |
| 15JIN2 | Foreign Language - German 2 f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign languag | Z writing skills i | |
| Dasic structures o | groups texts with professional topics. | je, whiting skills, i | nauvance |
| 15JIN3 | Foreign Language - German 3 | Z | 0 |
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| | groups texts with professional topics. | | |
| 15JIN4 | Foreign Language - German 4 | Z | 0 |
| Basic structures c | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advance |
| | groups texts with professional topics. | | |
| 15JIR1 | Foreign Language - Russian 1 | Z | 0 |
| Basic structures o | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advance |
| | groups texts with professional topics. | 7 | |
| 15JIR2 | Foreign Language - Russian 2 f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign languag | Z writing skills i | 0 0 |
| Sasic structures o | groups texts with professional topics. | je, whung skills, i | n auvance |
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| | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | _ | - |
| | groups texts with professional topics. | jo, mining onino, i | in da ranco |
| 15JIR4 | Foreign Language - Russian 4 | Z | 0 |
| Basic structures c | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advance |
| | groups texts with professional topics. | | |
| 15JIS1 | Foreign Language - Spanish 1 | Z | 0 |
| Basic structures o | f foreign language, communication in everyday life, study, work, leiser time activities, introducing myself, phonetics of foreign language | ge, writing skills, i | n advanced |
| 45 1100 | groups texts with professional topics. | | |
| 15JIS2 | | 7 | |
| | Foreign Language - Spanish 2 | Z Janguage writin | 0 a skills |
| Basic structur | res of Spanish language, communication in everyday life, study, work, leisere time activities, introducing myself, phonetics of Spanish | language, writin | g skills. |
| Basic structur 15JIS3 | | language, writing Z | g skills. |
| Basic structur 15JIS3 | res of Spanish language, communication in everyday life, study, work, leisere time activities, introducing myself, phonetics of Spanish Foreign Language - Spanish 3 | language, writing Z | g skills. |
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| 18XN2S | Master project 2 for study programme IS | Z | 6 |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|
| 18XN3S | Master project 3 for study programme IS | Z | 6 |
| 18XN4S | Master project 4 for study programme IS | Z | 10 |
| 20BITS | Safety and reliability of ITS Systems | KZ | 3 |
| The basic concep | ts of safety and reliability in the job and application. Basic schema and types of diagnostic systems including reliability diagnostics of | technical equipme | nt and ITS. |
| Investigation of ac | ceptability and reliability prediction, traffic crity and sensitivity analysis. Neural Networks and other optimization algorithms and ETA, | FMEA failure anal | ysis. HMI in |
| | traffic including operator testing on simulator and in real-world situatiation | 1 | |
| 20GINS | 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 | | |
| It introduces stude | nts to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitiz | ation methods, an | d a number |
| | of other GIS related technologies such as problem mapping, webmap, etc. | | - |
| 20ITSR | ITS - R | Z,ZK | 3 |
| | is devoted to description of the architecture and interface of the system with the ITS-R concept, the communication interface of the s | | • |
| functional and secu | rity features are defined. The principles of ERTMS / ETCS application level 3, UGTMS, CBTC are discussed in detail. Current and futur are described. | e communication t | ecnnologies |
| 20MZZ | | Z,ZK | 3 |
| | Modern techniques of safety control of moving railway vehicles concepts, ETCS architecture and interface descriptions, ERTMS system level, infrastructure and mobile part of the system, linking to | · · · | - |
| | ication modes of the system, infrastructure orientation, interface (DMI), integration of the ETCS mobile part into the driving vehicle, G | | |
| | testing and legislation. | | peemeation, |
| 20TBSS | Technology and Security of Sensor Networks | KZ | 2 |
| | safety and reliability in transport and its application. Basic scheme and types of diagnostic systems, including reliability diagnostics o | | |
| | of the area of acceptability and prediction of reliability, sensitivity in transport and sensitivity analysis. Neural networks and other opti | • • | • |
| | analysis ETA, FMEA. HMI in transport, including operator testing on a simulator and in real situations. | | |
| 20TSJ | Telematic systems and their design | Z,ZK | 6 |
| Gradual detail | ed analysis of individual existing telematics systems in modes of transport, such as toll systems, vehicle weighing, fleet management | t, traffic manageme | ent, etc. |
| 20XN1S | Master project 1 for study programme IS | Z | 5 |
| 20XN2S | Master project 2 for study programme IS | Z | 6 |
| 20XN3S | Master project 3 for study programme IS | Z | 6 |
| 20XN4S | Master project 4 for study programme IS | Z | 10 |
| 21XN1S | Master project 1 for study programme IS | Z | 5 |
| 21XN2S | Master project 2 for study programme IS | Z | 6 |
| 21XN3S | Master project 3 for study programme IS | Z | 6 |
| 21XN4S | Master project 4 for study programme IS | Z | 10 |
| 22XN1S | Master project 1 for study programme IS | Z | 5 |
| 22XN2S | Master project 2 for study programme IS | Z | 6 |
| 22XN3S | Master project 2 for study programme IS | Z | 6 |
| 22XN4S | Master project 3 for study programme IS | 7 | 10 |
| 22/1140 | | L 2 | |

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