Study plan

Name of study plan: IS nav.prez.17/18 čeština

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Technology in Transportation and Telecommunications
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: Semestrální projekt
Minimal number of credits of the block: 16
The role of the block: ZP

Code of the group: XN IS 1.-4. 13/14
Name of the group: Projekt oboru IS 1.-4.sem. od 13/14 (pro N3710)
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 4 courses
Credits in the group: 16
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
11XN1	**Master Project 1** ***Ivan Nagy***	Z	2	0P+2C+4B	Z	ZP
11XN2	**Master Project 2** ***Ivan Nagy***	Z	2	0P+2C+8B	L	ZP
11X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
11XN4	**Master Project 4**	Z	8	0P+4C	L	ZP
12XN1	**Master Project 1** *Zuzana Čarská, Dagmar Kočárková, Iva Šturmová, Kristýna Neubergová, Martin Jacura, Jan Kruntorád, Ondřej Trešl, David Vodák, Tomáš Javořík, ...*	Z	2	0P+2C+4B	Z	ZP
12XN2	**Master Project 2** *Zuzana Čarská, Dagmar Kočárková, Kristýna Neubergová, Martin Jacura, Jan Kruntorád, Ondřej Trešl, David Vodák, Tomáš Javořík, Pavel Purkart, ...*	Z	2	0P+2C+8B	L	ZP
12X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
12XN4	**Master Project 4** *Zuzana Čarská, Dagmar Kočárková, Kristýna Neubergová, Martin Jacura, Jan Kruntorád, Ondřej Trešl, David Vodák, Tomáš Javořík, Pavel Purkart, ...*	Z	8	0P+4C	L	ZP
14XN1	**Master Project 1**	Z	2	0P+2C+4B	Z	ZP
14XN2	**Master Project 2**	Z	2	0P+2C+8B	L	ZP
14X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
14XN4	**Master Project 4**	Z	8	0P+4C	L	ZP
15XN1	**Master Project 1**	Z	2	0P+2C+4B	Z	ZP
15XN2	**Master Project 2**	Z	2	0P+2C+8B	L	ZP
15X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
15XN4	**Master Project 4**	Z	8	0P+4C	L	ZP
16XN1	**Master Project 1** *Přemysl Toman*	Z	2	0P+2C+4B	Z	ZP
16XN2	**Master Project 2** *Přemysl Toman, Josef Mík*	Z	2	0P+2C+8B	L	ZP
16X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
16XN4	**Master Project 4** *Josef Mík, Michal Cenkner*	Z	8	0P+4C	L	ZP

17XN1	**Master Project 1** *Václav Baroch, Michal Drábek, Alexandra Dvořáčková, Veronika Faifrová, Eliška Glaserová, Rudolf F. Heidu, Tomáš Horák, Vít Janoš, Milan Kříž, ...*	Z	2	0P+2C+4B	Z	ZP
17XN2	**Master Project 2** *Václav Baroch, Michal Drábek, Alexandra Dvořáčková, Veronika Faifrová, Rudolf F. Heidu, Tomáš Horák, Vít Janoš, Milan Kříž, Olga Mertlová, ... Vít Janoš (Gar.)*	Z	2	0P+2C+8B	L	ZP
17X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
17XN4	**Master Project 4** *Václav Baroch, Michal Drábek, Alexandra Dvořáčková, Veronika Faifrová, Rudolf F. Heidu, Tomáš Horák, Vít Janoš, Milan Kříž, Olga Mertlová, ... Václav Baroch (Gar.)*	Z	8	0P+4C	L	ZP
18XN1	**Master Project 1** *Václav Rada, Nela Krčmářová*	Z	2	0P+2C+4B	Z	ZP
18XN2	**Master Project 2**	Z	2	0P+2C+8B	L	ZP
18X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
18XN4	**Master Project 4**	Z	8	0P+4C	L	ZP
20XN1	**Master Project 1** *Jiří Růžička*	Z	2	0P+2C+4B	Z	ZP
20XN2	**Master Project 2** *Jiří Růžička, Patrik Horažďovský* ***Vladimír Faltus***	Z	2	0P+2C+8B	L	ZP
20X13	**Master Project 3** ***Vladimír Faltus***	Z	4	0P+5C	Z	ZP
20XN4	**Master Project 4**	Z	8	0P+4C	L	ZP
21XN1	**Master Project 1** *Jakub Kraus, Andrej Lališ, Slobodan Stojić, Terézia Pilmannová, Jakub Hospodka, Lenka Hanáková, Vladimír Socha, Peter Vittek, Lukáš Popek, ...*	Z	2	0P+2C+4B	Z	ZP
21XN2	**Master Project 2**	Z	2	0P+2C+8B	L	ZP
21X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
21XN4	**Master Project 4** *Slobodan Stojić, Terézia Pilmannová, Vladimír Socha, Peter Vittek, Jakub Steiner, Miloš Strouhal, Ota Hajzler, Iveta Kameníková, Petr Lukeš, ...*	Z	8	0P+4C	L	ZP
22XN1	**Master Project 1** *Michal Frydrýn, Karel Kocián, Luboš Nouzovský, Zdeněk Svatý, Jakub Nováček*	Z	2	0P+2C+4B	Z	ZP
22XN2	**Master Project 2** *Michal Frydrýn, Karel Kocián, Luboš Nouzovský, Zdeněk Svatý, Jakub Nováček*	Z	2	0P+2C+8B	L	ZP
22X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
22XN4	**Master Project 4** *Michal Frydrýn, Karel Kocián, Luboš Nouzovský, Zdeněk Svatý*	Z	8	0P+4C	L	ZP
23XN1	**Master Project 1**	Z	2	0P+2C+4B	Z	ZP
23XN2	**Master Project 2**	Z	2	0P+2C+8B	L	ZP
23X13	**Master Project 3**	Z	4	0P+5C	Z	ZP
23XN4	**Master Project 4**	Z	8	0P+4C	L	ZP

Characteristics of the courses of this group of Study Plan: Code=XN IS 1.-4. 13/14 Name=Projekt oboru IS 1.-4.sem. od 13/14 (pro N3710)

11XN1	Master Project 1	Z	2
11XN2	Master Project 2	Z	2
11X13	Master Project 3	Z	4
11XN4	Master Project 4	Z	8
12XN1	Master Project 1	Z	2
12XN2	Master Project 2	Z	2
12X13	Master Project 3	Z	4
12XN4	Master Project 4	Z	8
14XN1	Master Project 1	Z	2
14XN2	Master Project 2	Z	2
14X13	Master Project 3	Z	4
14XN4	Master Project 4	Z	8
15XN1	Master Project 1	Z	2
15XN2	Master Project 2	Z	2
15X13	Master Project 3	Z	4
15XN4	Master Project 4	Z	8
16XN1	Master Project 1	Z	2
16XN2	Master Project 2	Z	2
16X13	Master Project 3	Z	4
16XN4	Master Project 4	Z	8
17XN1	Master Project 1	Z	2
17XN2	Master Project 2	Z	2

17X13	Master Project 3	Z	4
17XN4	Master Project 4	Z	8
18XN1	Master Project 1	Z	2
18XN2	Master Project 2	Z	2
18X13	Master Project 3	Z	4
18XN4	Master Project 4	Z	8
20XN1	Master Project 1	Z	2
20XN2	Master Project 2	Z	2
20X13	Master Project 3	Z	4
20XN4	Master Project 4	Z	8
21XN1	Master Project 1	Z	2
21XN2	Master Project 2	Z	2
21X13	Master Project 3	Z	4
21XN4	Master Project 4	Z	8
22XN1	Master Project 1	Z	2
22XN2	Master Project 2	Z	2
22X13	Master Project 3	Z	4
22XN4	Master Project 4	Z	8
23XN1	Master Project 1	Z	2
23XN2	Master Project 2	Z	2
23X13	Master Project 3	Z	4
23XN4	Master Project 4	Z	8

Name of the block: Compulsory courses
Minimal number of credits of the block: 104
The role of the block: Z

Code of the group: 1.S.NPIS 15/16 CZ
Name of the group: 1.sem.nav.prez.IS -15/16 čeština
Requirement credits in the group: In this group you have to gain 28 credits
Requirement courses in the group: In this group you have to complete 8 courses
Credits in the group: 28
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
11MAI	**ITS Mathematical Tools** *Jan Přikryl* ***Jan Přikryl*** *Jan Přikryl (Gar.)*	Z,ZK	4	2P+2C	Z	z
11TEF	**Theoretical Physics at Transportation**	Z,ZK	3	2P+1C	Z	z
12TDP	**Traffic Flow Theory** *Vladimír Faltus*	Z,ZK	3	2P+1C	Z	z
20SK	**Signals and Codes**	Z,ZK	4	2P+1C	Z	z
20TRAS	**Control and Reliability Theory in Transportation**	ZK	4	4P+0C	Z	z
20TSJ	**Telematic systems and their design** *Pavel Hrubeš, Martin Langr*	Z,ZK	6	3P+2C	Z	z
14PBT	**Advanced Wireless Technology**	KZ	2	2P+0C	Z	z
14PROM	**Process Modeling** *Marek Kalika Marek Kalika (Gar.)*	KZ	2	2P+0C+8B	L	z

Characteristics of the courses of this group of Study Plan: Code=1.S.NPIS 15/16 CZ Name=1.sem.nav.prez.IS -15/16 čeština

11MAI	ITS Mathematical Tools	Z,ZK	4
Series, Fourier Series. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analysis to PDE. Fundamentals of Numerical Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following models as ODEs.			
11TEF	Theoretical Physics at Transportation	Z,ZK	3
Generalized coordinates, Lagrange's equations of the first and the second kind, Hamilton's canonical equations, Canonical transformations,ergodic system, Weekly nonintegrable Hamilton's systém, Chaos, Potencial flow, Circumfluence of cylinder, conformal transformation, and method of singularity, Laminar flow, Turbulent flow.			
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, statistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation between traffic models and traffic flow management.			
20SK	Signals and Codes	Z,ZK	4
Time and frequency representation of signals. Discretization of signals, sampling, quantization and coding. Signal transmission, modulation and coding. Coding theory, information theory. Checksums and selfcorrecting codes. Cryptography protocols. MATLAB excercises. Practical applications of coding and modulation.			

20TRAS	Control and Reliability Theory in Transportation	ZK	4
Advanced methods of automatic control. Methods of state space control, nonlinear control, adaptive control, fuzzy control and stochastic control. Application of these methods on vehicular control and the control of traffic flows. Predicative diagnostics, safety in the traffic vehicles, safety infrastructure, human in the transportation and traffic systems and application of safety systems in transportation.			
20TSJ	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.			
14PBT	Advanced Wireless Technology	KZ	2
Wireless networks technology is applied in intelligent building management, in environmental monitoring, transportation, etc. Students will acquire knowledge regarding the wireless transmission of data in various frequency bands, according to the communication standard IEEE 802.15.4 and Zigbee PRO protocol, Bluetooth, WiFi, WirelessHART, NFC, etc. The course will also include energy performance capture and network security.			
14PROM	Process Modeling	KZ	2
Definition of the process, role, KPI's, areas of interest. Process Map, definition, purpose, clear examples and demonstrations, recommendations and standards, SIPOC. Process model, definition, purpose, procedures and tools, static and dynamic models. BPMN language, syntax and semantics, process flows. Implementation of practical examples, As-Is, To-Be, optimization and evaluation.			

Code of the group: 2.S.NPIS 13/14
Name of the group: 2.sem.nav.prez.IS 13/14
Requirement credits in the group: In this group you have to gain 28 credits
Requirement courses in the group: In this group you have to complete 11 courses
Credits in the group: 28
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
11RZ1	**Pattern Recognition 1**	Z,ZK	3	2P+1C	L	z
11ZDA	**Data Processing**	Z,ZK	3	2P+1C	L	z
14TITS	**Telecommunications in ITS**	Z,ZK	3	2P+1C	L	z
14UES	**Artificial Intelligence and Expert Systems in Transport**	ZK	2	2P+0C	L	z
20ARR	**Risk Analysis and Management**	Z,ZK	2	1P+1C	L	z
23IV	**Intelligent Vehicle and Safety**	Z,ZK	2	1P+1C	L	z
20EMI	**Economy and Management of ITS Projects**	KZ	3	2P+1C	L	z
14DMS	**Traffic Modelling and Simulation**	Z	4	1P+3C	L	z
16TAJ	**Technological Aspects of Quality**	Z	2	2P+0C	L	z
20IDFS	**Identification Systems**	Z	2	2P+0C	L	z
22APN	**Analysis and Prevention of Traffic Accidents**	Z	2	1P+1C	L	z

Characteristics of the courses of this group of Study Plan: Code=2.S.NPIS 13/14 Name=2.sem.nav.prez.IS 13/14

11RZ1	Pattern Recognition 1	Z,ZK	3
Elements of pattern recognition. Basic PR concepts. Bayesian decision theory. Learning theory. Parametric classifiers. Context classifiers. Classification quality estimation. Vector support machines. Non-parametric classifiers. Feature selection. Cluster analysis.			
11ZDA	Data Processing	Z,ZK	3
Specific problems of the field of processing of traffic data. Data preprocessing and analysis for use in additional applications.			
14TITS	Telecommunications in ITS	Z,ZK	3
Specific legislative conditions for telecommunications solutions designed for ITS systems, quantification of telecommunications system parameters, relation between telematic (ITS) and telecommunications performance indicators, available tools for management of required telecommunications performance indicators limits namely within the data IP based networks, Typical data telecommunications solutions (backbone and access) applied within ITS.			
14UES	Artificial Intelligence and Expert Systems in Transport	ZK	2
Introduction to artificial intelligence, work in unified state space and with related techniques.			
20ARR	Risk Analysis and Management	Z,ZK	2
The main focus of the course is to acquaint with the analysis, evaluation and control of risks in road transport, especially in relation to the tunnels. They are presented probabilistic and deterministic methods for risk assessment, human behavior in crisis situations and factors that influence it. Students are more familiar with tunnel technology and repeats the basic concepts of the theory of traffic flow.			
23IV	Intelligent Vehicle and Safety	Z,ZK	2
Content of the subject are basic terms, types of traffic injuries, restraint systems, injury biomechanics, active and passive safety.			
20EMI	Economy and Management of ITS Projects	KZ	3
The course presents basic theoretical knowledge for ITS effectiveness assesment in a lot of typical projects. The course covers methodology to obtain economy and financial models and their mutual synthesis to provide basis for feasibility studies for ITS implementation. It includes basic methods of project management with respect to the organizational and legislative aspects of ITS projects.			
14DMS	Traffic Modelling and Simulation	Z	4
Introduction to the tools for traffic simulation. Parameter modification and tuning, application in praxis.			
16TAJ	Technological Aspects of Quality	Z	2
Certification and accreditation, quality management, standards of quality management and its application, quality system creation, tools and methods of quality improvement, conformity assurance, environmental certification, workplace certification, QMS integration, classification, certification of products and producers.			

20IDFS	Identification Systems	Z	2
Basic identification systems, its technologies (barcodes, RFID, biomerics), their features, usage, security and standards. Applications of identification systems, e. g. identificaiton of vehicles, cargo, devices and processes. Identifier as foundation of traffic telematics standardization.			
22APN	Analysis and Prevention of Traffic Accidents	Z	2
Basic definitions, types of source materials, methods of analysis, influence of road, factors of accidents, vehicle faults etc.			

Code of the group: 3.S.NPIS 16/17 CZ
Name of the group: 3.sem.nav.prez. IS 16/17 čeština
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 7 courses
Credits in the group: 22
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
11MMJ	**Mathematical Models and their Applications** *Evženie Uglickich, Pavla Pecherková, Šárka Voráčová, Ivan Nagy, Michal Matowicki* ***Pavla Pecherková*** *Evženie Uglickich (Gar.)*	Z,ZK	4	2P+2C+12B	Z	z
20GIL	**Geographical, Information, Localization and Navigation systems**	Z,ZK	6	2P+2C	Z	z
20SYN	**System Engineering**	Z,ZK	3	2P+1C	Z	z
14PMD	**Advanced Models for Transport**	KZ	2	2P+0C	Z	z
20HITS	**ITS Effectiveness Assessment**	KZ	2	2P+0C	Z	z
12DZP	**Transport and Environment**	Z	2	2P+0C	Z	z
16MRJ	**Modelling of "Human - Machine" Interface**	Z	3	2P+1C	Z	z

Characteristics of the courses of this group of Study Plan: Code=3.S.NPIS 16/17 CZ Name=3.sem.nav.prez. IS 16/17 čeština

11MMJ	Mathematical Models and their Applications	Z,ZK	4
System. Regression, discrete and logistic models. Bayesian estimation of model parameters. Parameter estimation of normal regression, discrete and logistic models. Classification with logistic model. One-step and multi-step prediction with regression and discrete models. State model. State estimation. Kalman filter. Control with regression and discrete models.			
20GIL	Geographical, Information, Localization and Navigation systems	Z,ZK	6
Introduction to GIS, model of real world, data structure for spatial data, methods if data input, digitalisation, geographics coordination systems, map projection, vector data form, raster data form, spatial relationships and algorithms, general GIS tasks, transportation domain, GIS applications. Main principles of localization, satellite localization, performance parameters, processing of positioning data, digital carthographic data for navigation, navigation systems, dynamical navigation systems, aplications of navigation systems.			
20SYN	System Engineering	Z,ZK	3
Enlarged definition of system in space of engineer tasks, specification of selected types of systems versus linked tools of system analysis and projection, acquitance with selected instruments of identification of complicated systems, specifying of selected types of system engineering tasks. Examples of system enginnering's practical methods and tools.			
14PMD	Advanced Models for Transport	KZ	2
Model category, description of particular model types from discrete to continuous, explanation of applicability of the models to modeling of different kinds of transport. There is not omitted user aspect and there are explained typical bottlenecks of particular model use.			
20HITS	ITS Effectiveness Assessment	KZ	2
The course presents the knowledge of strategical plans, feasibility studies of ITS systems implementation based on available information together with the assessment of different phases of ITS project.			
12DZP	Transport and Environment	Z	2
This course aims the impact of transport on environment. The accent is put mainly on noise and vibration, emission, barrier effect and energy demands. The noise measury is part and parcel of this course.			
16MRJ	Modelling of "Human - Machine" Interface	Z	3
Aspects of human -machine interaction. Summary of areas where HMI takes an important place in particular in transportation. Examples of vehicle simulators.			

Code of the group: 3.S.NPIS-V1-12/13
Name of the group: 3.sem.obor IS 1.výběr předmětů od 12/13 (pro N3710)
Requirement credits in the group: In this group you have to gain 2 credits
Requirement courses in the group: In this group you have to complete 1 course
Credits in the group: 2
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
16VS	**Vehicle Control Systems**	Z,ZK	2	1P+1C	Z	z
20PTA	**Advanced Telematic Applications**	Z,ZK	2	1P+1C	Z	z
20ZZZ	**Railway Interlocking Systems**	Z,ZK	2	1P+1C	Z	z

Characteristics of the courses of this group of Study Plan: Code=3.S.NPIS-V1-12/13 Name=3.sem.obor IS 1.výběr předmětů od 12/13 (pro N3710)

16VS	Vehicle Control Systems	Z,ZK	2
Basic features of regulatory technology and theory of control. Elementary regulators (PID), dynamic properties of a vehicle and driver as a regulator. Combustion engine control, static engine optimization, control unit requirements. Electric driver and its components. DC devices, asynchronous engines, syncronous engines - principles, construction, elementary features and operation. Hybrid drive control to obtain the optimal efficiency. Car communication bus (CAN, LIN, FlexRay, ISObus, KWP2000 protocole etc). Control, safety, communication and comfort electronic systems in a car. The practice is performed with real and simulated systems, car system communication, laboratory experiments and control on selected electric devices.			
20PTA	Advanced Telematic Applications	Z,ZK	2
The course presents basic knowledge and description of ITS systems and services for public transport, e.g. for public transport companies, for users of public transport, for public transport integrators, etc. and or freight transport, e.g. dangerous goods transport, transport of animals, etc.			
20ZZZ	Railway Interlocking Systems	Z,ZK	2
This course reassume on the course "Railway interlocking plants". With basic knowledge about parts Railway interlocking plants, this course describes function and koncept railway interlocking systems. The main aim is observe on modern electronic systems and other systems with high level of railway control automation. Deal of this course will be focused on interoperability of control and command in railway.			

Code of the group: 3.S.NPIS-V2-12/13
Name of the group: 3.sem.obor IS 2.výběr předmětů od 12/13 (pro N3710)
Requirement credits in the group: In this group you have to gain 2 credits
Requirement courses in the group: In this group you have to complete 1 course
Credits in the group: 2
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
14BKA	**Safety Critical Applications in ITS**	KZ	2	2P+0C	Z	z
18STC	**Special Materials and Technology** *Jaroslav Valach*	KZ	2	2P+0C	Z	z

Characteristics of the courses of this group of Study Plan: Code=3.S.NPIS-V2-12/13 Name=3.sem.obor IS 2.výběr předmětů od 12/13 (pro N3710)

14BKA	Safety Critical Applications in ITS	KZ	2
The need of system solution of HW and SW safety, partial specifics of safety, methods of safe systems development and safety proving. Introduction into legislative framework.			
18STC	Special Materials and Technology	KZ	2
Basic Classification of Materials. Semiconductors. Ceramic materials. Polymers. Special kinds of Steels. Properties of Composite Materials.			

Code of the group: XNDPIS 13/14
Name of the group: Diplomová práce obor IS od 13/14
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 1 course
Credits in the group: 22
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
12XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
11XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
14XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
15XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
16XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
23XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
18XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
20XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
21XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
22XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z
17XIDP	**Diploma Thesis (for the Field IS)**	KZ	22	0P+24C	L	z

Characteristics of the courses of this group of Study Plan: Code=XNDPIS 13/14 Name=Diplomová práce obor IS od 13/14

12XIDP	Diploma Thesis (for the Field IS)	KZ	22
11XIDP	Diploma Thesis (for the Field IS)	KZ	22
14XIDP	Diploma Thesis (for the Field IS)	KZ	22

15XIDP	Diploma Thesis (for the Field IS)	KZ	22
16XIDP	Diploma Thesis (for the Field IS)	KZ	22
23XIDP	Diploma Thesis (for the Field IS)	KZ	22
18XIDP	Diploma Thesis (for the Field IS)	KZ	22
20XIDP	Diploma Thesis (for the Field IS)	KZ	22
21XIDP	Diploma Thesis (for the Field IS)	KZ	22
22XIDP	Diploma Thesis (for the Field IS)	KZ	22
17XIDP	Diploma Thesis (for the Field IS)	KZ	22

List of courses of this pass:

Code	Name of the course	Completion	Credits
11MAI	ITS Mathematical Tools	Z,ZK	4
	Series, Fourier Series. Discrete Fourier Transform. Segmentation of signals, windows, localization. Short-term Fourier Transform. From Fourier Analysis to PDE. Fundamentals of Numerical Mathematics. Numerical solutions to ODEs and PDEs. Continuous traffic flow models described by PDE. Car-following models as ODEs.		
11MMJ	Mathematical Models and their Applications	Z,ZK	4
	System. Regression, discrete and logistic models. Bayesian estimation of model parameters. Parameter estimation of normal regression, discrete and logistic models. Classification with logistic model. One-step and multi-step prediction with regression and discrete models. State model. State estimation. Kalman filter. Control with regression and discrete models.		
11RZ1	Pattern Recognition 1	Z,ZK	3
	Elements of pattern recognition. Basic PR concepts. Bayesian decision theory. Learning theory. Parametric classifiers. Context classifiers. Classification quality estimation. Vector support machines. Non-parametric classifiers. Feature selection. Cluster analysis.		
11TEF	Theoretical Physics at Transportation	Z,ZK	3
	Generalized coordinates, Lagrange's equations of the first and the second kind, Hamilton's canonical equations, Canonical transformations,ergodic system, Weekly nonintegrable Hamilton's systém, Chaos, Potencial flow, Circumfluence of cylinder, conformal transformation, and method of singularity, Laminar flow, Turbulent flow.		
11X13	Master Project 3	Z	4
11XIDP	Diploma Thesis (for the Field IS)	KZ	22
11XN1	Master Project 1	Z	2
11XN2	Master Project 2	Z	2
11XN4	Master Project 4	Z	8
11ZDA	Data Processing	Z,ZK	3
	Specific problems of the field of processing of traffic data. Data preprocessing and analysis for use in additional applications.		
12DZP	Transport and Environment	Z	2
	This course aims the impact of transport on environment. The accent is put mainly on noise and vibration, emission, barrier effect and energy demands. The noise measury is part and parcel of this course.		
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, statistical and microscopic models. Theory of shock waves, queuing theory and special theory of traffic phenomena. Relation between traffic models and traffic flow management.		
12X13	Master Project 3	Z	4
12XIDP	Diploma Thesis (for the Field IS)	KZ	22
12XN1	Master Project 1	Z	2
12XN2	Master Project 2	Z	2
12XN4	Master Project 4	Z	8
14BKA	Safety Critical Applications in ITS	KZ	2
	The need of system solution of HW and SW safety, partial specifics of safety, methods of safe systems development and safety proving. Introduction into legislative framework.		
14DMS	Traffic Modelling and Simulation	Z	4
	Introduction to the tools for traffic simulation. Parameter modification and tuning, application in praxis.		
14PBT	Advanced Wireless Technology	KZ	2
	Wireless networks technology is applied in intelligent building management, in environmental monitoring, transportation, etc. Students will acquire knowledge regarding the wireless transmission of data in various frequency bands, according to the communication standard IEEE 802.15.4 and Zigbee PRO protocol, Bluetooth, WiFi, WirelessHART, NFC, etc. The course will also include energy performance capture and network security.		
14PMD	Advanced Models for Transport	KZ	2
	Model category, description of particular model types from discrete to continuous, explanation of applicability of the models to modeling of different kinds of transport. There is not omitted user aspect and there are explained typical bottlenecks of particular model use.		
14PROM	Process Modeling	KZ	2
	Definition of the process, role, KPI's, areas of interest. Process Map, definition, purpose, clear examples and demonstrations, recommendations and standards, SIPOC. Process model, definition, purpose, procedures and tools, static and dynamic models. BPMN language, syntax and semantics, process flows. Implementation of practical examples, As-Is, To-Be, optimization and evaluation.		
14TITS	Telecommunications in ITS	Z,ZK	3
	Specific legislative conditions for telecommunications solutions designed for ITS systems, quantification of telecommunications system parameters, relation between telematic (ITS) and telecommunications performance indicators, available tools for management of required telecommunications performance indicators limits namely within the data IP based networks, Typical data telecommunications solutions (backbone and access) applied within ITS.		
14UES	Artificial Intelligence and Expert Systems in Transport	ZK	2
	Introduction to artificial intelligence, work in unified state space and with related techniques.		

14X13	Master Project 3	Z	4
14XIDP	Diploma Thesis (for the Field IS)	KZ	22
14XN1	Master Project 1	Z	2
14XN2	Master Project 2	Z	2
14XN4	Master Project 4	Z	8
15X13	Master Project 3	Z	4
15XIDP	Diploma Thesis (for the Field IS)	KZ	22
15XN1	Master Project 1	Z	2
15XN2	Master Project 2	Z	2
15XN4	Master Project 4	Z	8
16MRJ	Modelling of "Human - Machine" Interface	Z	3
Aspects of human -machine interaction. Summary of areas where HMI takes an important place in particular in transportation. Examples of vehicle simulators.			
16TAJ	Technological Aspects of Quality	Z	2
Certification and accreditation, quality management, standards of quality management and its application, quality system creation, tools and methods of quality improvement, conformity assurance, environmental certification, workplace certification, QMS integration, classification, certification of products and producers.			
16VS	Vehicle Control Systems	Z,ZK	2
Basic features of regulatory technology and theory of control. Elementary regulators (PID), dynamic properties of a vehicle and driver as a regulator. Combustion engine control, static engine optimization, control unit requirements. Electric driver and its components. DC devices, asynchronous engines, syncronous engines - principles, construction, elementary features and operation. Hybrid drive control to obtain the optimal efficiency. Car communication bus (CAN, LIN, FlexRay, ISObus, KWP2000 protocole etc). Control, safety, communication and comfort electronic systems in a car. The practice is performed with real and simulated systems, car system communication, laboratory experiments and control on selected electric devices.			
16X13	Master Project 3	Z	4
16XIDP	Diploma Thesis (for the Field IS)	KZ	22
16XN1	Master Project 1	Z	2
16XN2	Master Project 2	Z	2
16XN4	Master Project 4	Z	8
17X13	Master Project 3	Z	4
17XIDP	Diploma Thesis (for the Field IS)	KZ	22
17XN1	Master Project 1	Z	2
17XN2	Master Project 2	Z	2
17XN4	Master Project 4	Z	8
18STC	Special Materials and Technology	KZ	2
Basic Classification of Materials. Semiconductors. Ceramic materials. Polymers. Special kinds of Steels. Properties of Composite Materials.			
18X13	Master Project 3	Z	4
18XIDP	Diploma Thesis (for the Field IS)	KZ	22
18XN1	Master Project 1	Z	2
18XN2	Master Project 2	Z	2
18XN4	Master Project 4	Z	8
20ARR	Risk Analysis and Management	Z,ZK	2
The main focus of the course is to acquaint with the analysis, evaluation and control of risks in road transport, especially in relation to the tunnels. They are presented probabilistic and deterministic methods for risk assessment, human behavior in crisis situations and factors that influence it. Students are more familiar with tunnel technology and repeats the basic concepts of the theory of traffic flow.			
20EMI	Economy and Management of ITS Projects	KZ	3
The course presents basic theoretical knowledge for ITS effectiveness assesment in a lot of typical projects. The course covers methodology to obtain economy and financial models and their mutual synthesis to provide basis for feasibility studies for ITS implementation. It includes basic methods of project management with respect to the organizational and legislative aspects of ITS projects.			
20GIL	Geographical, Information, Localization and Navigation systems	Z,ZK	6
Introduction to GIS, model of real world, data structure for spatial data, methods if data input, digitalisation, geographics coordination systems, map projection, vector data form, raster data form, spatial relationships and algorithms, general GIS tasks, transportation domain, GIS applications. Main principles of localization, satellite localization, performance parameters, processing of positioning data, digital carthographic data for navigation, navigation systems, dynamical navigation systems, aplications of navigation systems.			
20HITS	ITS Effectiveness Assessment	KZ	2
The course presents the knowledge of strategical plans, feasibility studies of ITS systems implementation based on available information together with the assessment of different phases of ITS project.			
20IDFS	Identification Systems	Z	2
Basic identification systems, its technologies (barcodes, RFID, biomerics), their features, usage, security and standards. Applications of identification systems, e. g. identificaiton of vehicles, cargo, devices and processes. Identifier as foundation of traffic telematics standardization.			
20PTA	Advanced Telematic Applications	Z,ZK	2
The course presents basic knowledge and description of ITS systems and services for public transport, e.g. for public transport companies, for users of public transport, for public transport integrators, etc. and or freight transport, e.g. dangerous goods transport, transport of animals, etc.			
20SK	Signals and Codes	Z,ZK	4
Time and frequency representation of signals. Discretization of signals, sampling, quantization and coding. Signal transmission, modulation and coding. Coding theory, information theory. Checksums and selfcorrecting codes. Cryptography protocols. MATLAB excercises. Practical applications of coding and modulation.			
20SYN	System Engineering	Z,ZK	3
Enlarged definition of system in space of engineer tasks, specification of selected types of systems versus linked tools of system analysis and projection, acquitance with selected instruments of identification of complicated systems, specifying of selected types of system engineering tasks. Examples of system enginnering's practical methods and tools.			

20TRAS	Control and Reliability Theory in Transportation	ZK	4
Advanced methods of automatic control. Methods of state space control, nonlinear control, adaptive control, fuzzy control and stochastic control. Application of these methods on vehicular control and the control of traffic flows. Predicative diagnostics, safety in the traffic vehicles, safety infrastructure, human in the transportation and traffic systems and application of safety systems in transportation.			
20TSJ	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.			
20X13	Master Project 3	Z	4
20XIDP	Diploma Thesis (for the Field IS)	KZ	22
20XN1	Master Project 1	Z	2
20XN2	Master Project 2	Z	2
20XN4	Master Project 4	Z	8
20ZZZ	Railway Interlocking Systems	Z,ZK	2
This course reassume on the course "Railway interlocking plants". With basic knowledge about parts Railway interlocking plants, this course describes function and koncept railway interlocking systems. The main aim is observe on modern electronic systems and other systems with high level of railway control automation. Deal of this course will be focused on interoperability of control and command in railway.			
21X13	Master Project 3	Z	4
21XIDP	Diploma Thesis (for the Field IS)	KZ	22
21XN1	Master Project 1	Z	2
21XN2	Master Project 2	Z	2
21XN4	Master Project 4	Z	8
22APN	Analysis and Prevention of Traffic Accidents	Z	2
Basic definitions, types of source materials, methods of analysis, influence of road, factors of accidents, vehicle faults etc.			
22X13	Master Project 3	Z	4
22XIDP	Diploma Thesis (for the Field IS)	KZ	22
22XN1	Master Project 1	Z	2
22XN2	Master Project 2	Z	2
22XN4	Master Project 4	Z	8
23IV	Intelligent Vehicle and Safety	Z,ZK	2
Content of the subject are basic terms, types of traffic injuries, restraint systems, injury biomechanics, active and passive safety.			
23X13	Master Project 3	Z	4
23XIDP	Diploma Thesis (for the Field IS)	KZ	22
23XN1	Master Project 1	Z	2
23XN2	Master Project 2	Z	2
23XN4	Master Project 4	Z	8

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