

# Study plan

**Name of study plan: bak.prez.od 16/17 - v 1.sem. si NEZAPSALI 14DB**

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Technology in Transportation and Telecommunications

Garantor of the study branch: doc. Ing. Jiří Čarský, Ph.D.

Program of study: Technology in Transportation and Telecommunications

Type of study: Bachelor full-time

Required credits: 90

Elective courses credits: 0

Sum of credits in the plan: 90

Note on the plan:

Name of the block: Compulsory courses

Minimal number of credits of the block: 90

The role of the block: Z

Code of the group: 1.S.BP 15/16

Name of the group: 1.sem.bak.prez. od 15/16

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 9 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
11CAL1	<b>Calculus 1</b> Magdalena Hykšová, Ondřej Navrátil, Bohumil Kovář, Pavel Provinský, Tomáš Třasák, Olga Vraštilová	Z,ZK	7	2P+4C	Z	z
11LA	<b>Linear Algebra</b> Pavel Provinský, Martina Bečvářová, Lucie Kárná, Jan Příklad	Z,ZK	3	2P+1C	Z	z
12ZYDI	<b>Introduction to Transportation Engineering</b> Dagmar Kočárková, Zuzana Čarská	Z,ZK	2	1P+1C	Z	z
18MTY	<b>Materials Science and Engineering</b> Vít Malinovský, Jaroslav Valach, Jan Šleicrt, Jan Šleicrt, Marcel Adorna, Jan Falta, Jan Falta, Václav Rada, Václav Rada, ..... Jaroslav Valach (Gar.)	Z,ZK	3	2P+1C	Z	z
20SYSA	<b>Systems Analysis</b> Zuzana Bělinová, Jiří Růžička, Zuzana Purkrábková, Patrik Horažďovský, Petr Bureš	Z,ZK	5	2P+2C+1AB	L	z
11GIE	<b>Geometry</b> Pavel Provinský, Oldřich Hykš, Šárka Voráčová	KZ	3	2P+2C	Z	z
18TED	<b>Technical Documentation</b> Vít Malinovský, Tomáš Fíla, Jitka Řezníčková	KZ	2	1P+1C	Z	z
16UDOP	<b>Introduction into Vehicles</b> Přemysl Toman, Josef Mík, Zuzana Radová, Petr Bouchner Petr Bouchner (Gar.)	Z	2	2P+0C	Z	z
TV-1	<b>Physical Education</b>	Z	1		Z	z

**Characteristics of the courses of this group of Study Plan: Code=1.S.BP 15/16 Name=1.sem.bak.prez. od 15/16**

11CAL1	Calculus 1	Z,ZK	7	Sequence of real numbers and its limit. Basic properties of mappings. Function of one real variable, its limit and derivative. Geometric properties of n-dimensional Euklidean space and Cartesian coordinate system. Geometric meaning of the differential of functions several real variables, differential calculus of functions of several real variables.
11LA	Linear Algebra	Z,ZK	3	Vector spaces (linear combinations, linear independence, dimension, basis, coordinates). Matrices and operations. Systems of linear equations and their solvability. Determinants and their applications. Scalar product. Similarity of matrices (eigenvalues and eigenvectors). Quadratic forms and their classification.
12ZYDI	Introduction to Transportation Engineering	Z,ZK	2	Role of transportation in land-use planning. Basic terms in transportation engineering. Traffic survey and traffic prognosis. Introduction to topic of roads, public mass transport. Negative impacts of transportation to environment and safety.
18MTY	Materials Science and Engineering	Z,ZK	3	Basic course of materials science and engineering explains mechanical properties of structural materials based on their bonding forces and microstructure. However the main attention is paid to metals as the most important engineering materials, also other major classes of materials are presented, namely ceramics, polymers and composites. Attention is also paid to degradation processes in materials, to defectoscopy and to main mechanical tests.

20SYSA	Systems Analysis	Z,ZK	5
Introduction to system sciences, system viewpoint, terminology, typical system analysis tasks, system identification, system interface and interface tasks, processes, system behaviour and its analysis, strong functions and processes, genetic code, system identity, system architecture. Tools for system analysis - Petri nets, decision tables, algorithms for structural tasks. Soft and hard systems, methods for soft system analysis.			
11GIE	Geometry	KZ	3
Orthographic and oblique projections, linear perspective. Topographic surfaces and their orthogonal projection. Differential geometry of curves - parameterization, arc of the curve, torsion and curvature, Frenet's trihedron. Kinematics - a curve as a trajectory of the motion, the velocity and acceleration of a particle moving on a curved path.			
18TED	Technical Documentation	KZ	2
Technical standards, international standardization, technical drawings, representation of technical objects, technical diagrams and charts, dimensional and geometrical accuracy, arrangement of drawing sheets.			
16UDOP	Introduction into Vehicles	Z	2
Vehicles and transportation systems. Functionality and setup. Movement and drive principles. Engines and their characteristics. Rail, road, air and water transport. Alternative means of transport. Lifting equipment and conveyors. Legislation.			
TV-1	Physical Education	Z	1

Code of the group: 1.S.BP VÝBĚR 15/16

Name of the group: 1.sem.bak. prez výběr předmětu od 15/16

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
14AS	Algorithm and Data Structures	KZ	2	0+2	Z	z
14AZ	Data Analysis and Processing	KZ	2	0+2	Z	z
14DB	Database Systems	KZ	2	0+2	Z	z

Characteristics of the courses of this group of Study Plan: Code=1.S.BP VÝBĚR 15/16 Name=1.sem.bak. prez výběr předmětu od 15/16

14AS	Algorithm and Data Structures	KZ	2
Students will be familiarized with selected basic and derived data structures, algorithms, their properties and their design procedure. Students will analyze problems, propose theoretical solutions to the set task and the resulting algorithm write by means of flowcharts, practice in reading algorithms recorded by means of the flowchart and use the basics of Boolean algebra with forming the conditions for the algorithms.			
14AZ	Data Analysis and Processing	KZ	2
Main aim of this course is learn students how to prepare raw data for following processing and analysis. Knowledge of algorithms for determining the parameters of different data sources; source can be used images, text, time series, etc. The next step is the theoretical skills and knowledge to apply in solving the problem, e. g. extraction parameters from the image data or from the Internet.			
14DB	Database Systems	KZ	2
Basic concepts of database systems, conceptual model, relational data model, the principles of normal forms, relational database design, security and integrity of data, database queries, relational algebra, SQL language, client / server, multilayer architectures, distributed database systems. Access to data via the WWW.			

Code of the group: 2.S.BP 15/16

Name of the group: 2.sem.bak.prez. 15/16

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
11CAL2	<b>Calculus 2</b> Magdalena Hykšová, Ondřej Navrátil, Tomáš Třasák, Olga Vraštilová, Martina Bečvářová, Oldřich Hykš <b>Magdalena Hykšová</b> Ondřej Navrátil (Gar.)	Z,ZK	5	2P+3C+20B	L	z
11FY1	<b>Physics 1</b> Zuzana Malá, Tomáš Vítů, Marek Honců Zuzana Malá (Gar.)	Z,ZK	4	2P+2C	L	z
11STAS	<b>Statistics</b> Pavla Pecherková	Z,ZK	5	2P+2C	L	z
12ZTS	<b>Railway Lines and Stations</b> Lukáš Týfa, Martin Vaněk, Martin Jacura, Tomáš Javořík, Vojtěch Novotný, Ondřej Trešl	Z,ZK	4	2P+2C+10B	L	z
18SAT	<b>Structural Analysis</b> Jan Šleichrt, Marcel Adorna, Jan Falta, Václav Rada, Václav Rada, Jitka Rezníčková, Tomáš Doktor, Jan Vyčichl, Daniel Kytýř, .....	Z,ZK	4	2P+2C+14B	L	z
17TEDL	<b>Transport Technology and Logistics</b> Vít Janoš, Zdeněk Michl, Milan Kříž, Jiří Pospíšil, Michal Drábek	KZ	3	2P+1C	L	z

21ZALD	<b>Basics of Air Transport</b> <i>Michaela Šerlová, Tereza Topková, Sébastien Lán, Sarah Van Den Bergh, Adam Kleczatský</i>	KZ	2	0P+2C+8B	L	Z
TV-2	<b>Physical Education</b>	Z	1		L	Z

**Characteristics of the courses of this group of Study Plan: Code=2.S.BP 15/16 Name=2.sem.bak.prez. 15/16**

11CAL2	Calculus 2				Z,ZK	5
Antiderivative, Newtonian integral, Riemannian integral of the function of one variable, improper Riemannian integral, Riemannian integral in $R^n$ . Parametric description of regular $k$ -dimensional surfaces in $R^n$ , Riemannian integral over regular surfaces. Line and surface integrals of the second type, Stokes theorems, ordinary differential equations of the first order, linear differential equations with constant coefficients and its systems.						
11FY1	Physics 1				Z,ZK	4
Kinematics, particle dynamics, dynamics of particle systems and rigid body. Continuum mechanics, thermodynamics, electric field, directed electric current.						
11STAS	Statistics				Z,ZK	5
Definition of probability, random variable and its description, known distributions, random vector, function of random variable. Methods of point estimation. Testing of statistical hypothesis. Regression and correlation, linear regression, correlation coefficient, coefficient of determination, the general linear model, statistical inference in linear regression, analysis of variance, multiple regression, the use of matrices in regression.						
12ZTS	Railway Lines and Stations				Z,ZK	4
Rail transport. Railway track geometry parameters. Route layout of railway lines. Railway line construction - railway substructure and superstructure. Spatial layout of railway lines. Railway control systems in relation to infrastructure. Operating and carriage points. Railway lines net and category. Traction in rail transport.						
18SAT	Structural Analysis				Z,ZK	4
General system of forces in plane and space. Calculation of reactions of bodies and structures. Assessment of internal forces on statically determinate beams and simple girders. Principle of virtual work. Kinematic method for calculation of reactions of statically determinate systems. Determination of axial forces in truss constructions. Cross-sectional characteristics of planar shapes. Fiber polygons and chains.						
17TEDL	Transport Technology and Logistics				KZ	3
Basic terms in transport technology and logistics, particular steps of transport planning, line planning, timetabling, planning in passenger and freight transport, organisation of traffic in each transport modus, technologic factors of the side of operator and client, organisation of city transport, logistic technologies and their application using various transport modus.						
21ZALD	Basics of Air Transport				KZ	2
History, definitions, terminology, basic rules. VFR/IFR. Basics of aerodynamics. Propulsion of aircraft. Aircraft design. Basics of navigation, radio navigation. Weight, balance, performance. Flight planning, optimization of speed and heights, minimum fuel. Limitations of operation, maintenance, service life of aircraft. Traffic management, ground handling, security. Air crew. Airlines and economics. Space technologies.						
TV-2	Physical Education				Z	1

Code of the group: 2.S.BP VÝBĚR 15/16

Name of the group: 2.sem.bak. prez výběr předmětu od 15/16

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
14KSP	<b>Constructing with Computer Aid</b> <i>Filip Müller, Martin Brumovský, Lukáš Kozel, Radek Kratochvil, Drahomír Schmidt, Lukáš Svoboda, Monika Stambolidis</i>	KZ	2	0P+2C	Z	Z
14PRG	<b>Programming</b> <i>Lukáš Svoboda, Vít Fábera, Radek Holý, Michal Jeřábek, Marek Kalíka, Jana Kalíková, Zdeněk Lokaj, Martin Šrotýř, Jan Zelenka Jana Kalíková (Gar.)</i>	KZ	2	0P+2C+8B	L	Z

**Characteristics of the courses of this group of Study Plan: Code=2.S.BP VÝBĚR 15/16 Name=2.sem.bak. prez výběr předmětu od 15/16**

14KSP	Constructing with Computer Aid				KZ	2
"CAD systems" term determination. CAD role in projecting system model. Existing CAD systems on Czech market. Project creation, basic common work rules in graphic applications and CA systems. Co-ordinated systems, CAD environment skill (basics of constructing, dimensioning, modifications, user interfaces, projecting possibilities, AutoCAD environment profiles, drawings with raster foundations).						
14PRG	Programming				KZ	2
Algorithm development, methods of structured programming, high-level programming languages, basics of C programming languages (types, variables, conditions, cycles, arrays, functions), programming techniques, complexity.						

Code of the group: 3.S.BP 17/18

Name of the group: 3.sem.bak.prez. 17/18 (bez Fyziky; v 1.sem. se NEzapsali 14DB)

Requirement credits in the group: In this group you have to gain 30 credits

Requirement courses in the group: In this group you have to complete 9 courses

Credits in the group: 30

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
15DPLG	<b>Transportation Psychology</b> Jan Feit, Jana Štikarová	Z	2	2P+0C	Z	z
23BDIS	<b>Safety Technologies of Transportation and Information Systems</b>	KZ	3	2+0	Z	z
12MDE	<b>Transport Models and Transport Excesses</b> Milan Dont, Josef Kocourek	Z,ZK	3	2P+1C	Z	z
17TGA	<b>Graph Theory and its Applications in Transport</b> Denisa Mocková, Alena Rybičková, Dušan Teichmann Alena Rybičková (Gar.)	Z,ZK	4	2P+2C	Z	z
18PZP	<b>Elasticity and Strength</b> Jan Šleichrt, Jan Šleichrt, Marcel Adorna, Jan Falta, Jan Falta, Jiřka Režničková, Tomáš Doktor, Jan Vyčichl, Daniel Kytýř, ..... Ondřej Jiroušek (Gar.)	Z,ZK	3	2P+1C	Z	z
20UITS	<b>Introduction to Intelligent Transport Systems</b> Jiří Růžička, Zuzana Purkrábková, Patrik Horažďovský, Martin Langr, Pavel Hrubeš, Tomáš Zelinka, Vladimír Faltus Vladimír Faltus (Gar.)	Z,ZK	7	3P+2C	Z	z
12PPOK	<b>Designing Roads, Highways and Motorways</b> Jiří Čarský, Petr Šatra, Jan Gallia, Tomáš Padělek, Petr Kumpošt	KZ	3	1P+2C	Z	z
14DATS	<b>Database Systems</b> Jana Kaliková, Martin Šrotýř, Jan Krčál Jana Kaliková (Gar.)	KZ	2	1P+1C	Z	z
15JZ1A	<b>Foreign Language - English 1</b> Jan Feit, Klára Lancová, Lenka Monková, Marie Michlová, Jiřka Heřmanová, Dana Boušová, Eva Rezlerová, Barbora Horáčková, Marek Tomeček, ..... Jiřka Heřmanová (Gar.)	Z	3	0P+4C	Z	z

**Characteristics of the courses of this group of Study Plan: Code=3.S.BP 17/18 Name=3.sem.bak.prez. 17/18 (bez Fyziky; v 1.sem. se NEzapsali 14DB)**

15DPLG	Transportation Psychology	Z	2	Subject of psychology and its basic concepts. Information intake, decision-making and behaviour. Performance. Engineering psychology and vehicle construction. Psychological aspects of travel route and traffic conditions, accidents and traffic incidents. Selection and training of the staff. Work and leisure. Age as a factor in transport operation.
23BDIS	Safety Technologies of Transportation and Information Systems	KZ	3	Safety of transportation means - principles, testing, evaluation. Safety of infrastructures, critical structures, crisis scenarios. Safety of information systems and their robustness.
12MDE	Transport Models and Transport Excesses	Z,ZK	3	Parameters of the traffic flow and methods for their measurement. Models of the traffic flow, communications load, line and urban systems. Theory of queues, shock waves. Quality of transport and its assessment. Statistical characteristics of transport. Transport excesses, their analysis, the causes, identify and minimize the consequences. Improving of transport safety and fluency.
17TGA	Graph Theory and its Applications in Transport	Z,ZK	4	Basic terms of graph theory, paths in graphs, flows in networks, location problems, design problems on graphs, optimum routing, use of graphs in other scientific disciplines.
18PZP	Elasticity and Strength	Z,ZK	3	Tension and compression. Bending of beam. Shear stress during bending of beam. Design and analysis of cross section of beam. Design of riveted, bolted and welded joint of structure. Analysis of deflection curve of beam. Torsion of circle cross section. Combined loading. Stability of compressed bar and buckling. Beam on elastic foundation. Strength analysis.
20UITS	Introduction to Intelligent Transport Systems	Z,ZK	7	Terminology and legislative framework telematics systems and their architecture. Telematics systems in practice and their operation. Fundamentals of information and telecommunication systems for ITS. Principles and technical support measurement of traffic data, localization and navigation. Practical work with traffic data. Real examples of possible applications of the principles of ITS.
12PPOK	Designing Roads, Highways and Motorways	KZ	3	Definition, types, ownership, maintenance, management and categorization of roads and highways. Curve and transition curve. Sinuosity and standard speed. Route in rural areas. Range of vision for stopping and overtaking. Road body - shapes and proportions, bottom and superstructure. Drainage and components of roads. Safety device. Crossings, junctions, intersections.
14DATS	Database Systems	KZ	2	Basic concepts of database systems, conceptual model, relational data model, the principles of normal forms, relational database design, security and integrity of data, database queries, relational algebra, SQL language, client / server, multilayer architectures, distributed database systems. Access to data via the WWW.
15JZ1A	Foreign Language - English 1	Z	3	Grammatical structures and style. Selection of conversation topics relating to transportation sciences. Extending vocabulary, developing perceptive and communicative skills. Elementary stylistics forms. Oral and written presentation of original research. Academic text principles and reading comprehension. Principles of rhetoric.

**List of courses of this pass:**

Code	Name of the course	Completion	Credits
11CAL1	Calculus 1	Z,ZK	7
Sequence of real numbers and its limit. Basic properties of mappings. Function of one real variable, its limit and derivative. Geometric properties of n-dimensional Eukclidean space and Cartesian coordinate system. Geometric meaning of the differential of functions several real variables, differential calculus of functions of several real variables.			
11CAL2	Calculus 2	Z,ZK	5
Antiderivative, Newtonian integral, Riemannian integral of the function of one variable, improper Riemannian integral, Riemannian integral in Rn. Parametric description of regular k-dimensional surfaces in Rn, Riemannian integral over regular surfaces. Line and surface integrals of the second type, Stokes theorems, ordinary differential equations of the first order, linear differential equations with constant coefficients and its systems.			

11FY1	Physics 1 Kinematics, particle dynamics, dynamics of particle systems and rigid body. Continuum mechanics, thermodynamics, electric field, directed electric current.	Z,ZK	4
11GIE	Geometry Orthographic and oblique projections, linear perspective. Topographic surfaces and their orthogonal projection. Differential geometry of curves - parameterization, arc of the curve, torsion and curvature, Frenet's trihedron. Kinematics - a curve as a trajectory of the motion, the velocity and acceleration of a particle moving on a curved path.	KZ	3
11LA	Linear Algebra Vector spaces (linear combinations, linear independence, dimension, basis, coordinates). Matrices and operations. Systems of linear equations and their solvability. Determinants and their applications. Scalar product. Similarity of matrices (eigenvalues and eigenvectors). Quadratic forms and their classification.	Z,ZK	3
11STAS	Statistics Definition of probability, random variable and its description, known distributions, random vector, function of random variable. Methods of point estimation. Testing of statistical hypothesis. Regression and correlation, linear regression, correlation coefficient, coefficient of determination, the general linear model, statistical inference in linear regression, analysis of variance, multiple regression, the use of matrices in regression.	Z,ZK	5
12MDE	Transport Models and Transport Excesses Parameters of the traffic flow and methods for their measurement. Models of the traffic flow, communications load, line and urban systems. Theory of queues, shock waves. Quality of transport and its assessment. Statistical characteristics of transport. Transport excesses, their analysis, the causes, identify and minimize the consequences. Improving of transport safety and fluency.	Z,ZK	3
12PPOK	Designing Roads, Highways and Motorways Definition, types, ownership, maintenance, management and categorization of roads and highways. Curve and transition curve. Sinuosity and standard speed. Route in rural areas. Range of vision for stopping and overtaking. Road body - shapes and proportions, bottom and superstructure. Drainage and components of roads. Safety device. Crossings, junctions, intersections.	KZ	3
12ZTS	Railway Lines and Stations Rail transport. Railway track geometry parameters. Route layout of railway lines. Railway line construction - railway substructure and superstructure. Spatial layout of railway lines. Railway control systems in relation to infrastructure. Operating and carriage points. Railway lines net and category. Traction in rail transport.	Z,ZK	4
12ZYDI	Introduction to Transportation Engineering Role of transportation in land-use planning. Basic terms in transportation engineering. Traffic survey and traffic prognosis. Introduction to topic of roads, public mass transport. Negative impacts of transportation to environment and safety.	Z,ZK	2
14AS	Algorithm and Data Structures Students will be familiarized with selected basic and derived data structures, algorithms, their properties and their design procedure. Students will analyze problems, propose theoretical solutions to the set task and the resulting algorithm write by means of flowcharts, practice in reading algorithms recorded by means of the flowchart and use the basics of Boolean algebra with forming the conditions for the algorithms.	KZ	2
14AZ	Data Analysis and Processing Main aim of this course is learn students how to prepare raw data for following processing and analysis. Knowledge of algorithms for determining the parameters of different data sources; source can be used images, text, time series, etc. The next step is the theoretical skills and knowledge to apply in solving the problem, e. g. extraction parameters from the image data or from the Internet.	KZ	2
14DATS	Database Systems Basic concepts of database systems, conceptual model, relational data model, the principles of normal forms, relational database design, security and integrity of data, database queries, relational algebra, SQL language, client / server, multilayer architectures, distributed database systems. Access to data via the WWW.	KZ	2
14DB	Database Systems Basic concepts of database systems, conceptual model, relational data model, the principles of normal forms, relational database design, security and integrity of data, database queries, relational algebra, SQL language, client / server, multilayer architectures, distributed database systems. Access to data via the WWW.	KZ	2
14KSP	Constructing with Computer Aid "CAD systems" term determination. CAD role in projecting system model. Existing CAD systems on Czech market. Project creation, basic common work rules in graphic applications and CA systems. Co-ordinated systems, CAD environment skill (basics of constructing, dimensioning, modifications, user interfaces, projecting possibilities, AutoCAD environment profiles, drawings with raster foundations).	KZ	2
14PRG	Programming Algorithm development, methods of structured programming, high-level programming languages, basics of C programming languages (types, variables, conditions, cycles, arrays, functions), programming techniques, complexity.	KZ	2
15DPLG	Transportation Psychology Subject of psychology and its basic concepts. Information intake, decision-making and behaviour. Performance. Engineering psychology and vehicle construction. Psychological aspects of travel route and traffic conditions, accidents and traffic incidents. Selection and training of the staff. Work and leisure. Age as a factor in transport operation.	Z	2
15JZ1A	Foreign Language - English 1 Grammatical structures and style. Selection of conversation topics relating to transportation sciences. Extending vocabulary, developing perceptive and communicative skills. Elementary stylistics forms. Oral and written presentation of original research. Academic text principles and reading comprehension. Principles of rhetoric.	Z	3
16UDOP	Introduction into Vehicles Vehicles and transportation systems. Functionality and setup. Movement and drive principles. Engines and their characteristics. Rail, road, air and water transport. Alternative means of transport. Lifting equipment and conveyors. Legislation.	Z	2
17TEDL	Transport Technology and Logistics Basic terms in transport technology and logistics, particular steps of transport planning, line planning, timetabling, planning in passenger and freight transport, organisation of traffic in each transport modus, technologic factors of the side of operator and client, organisation of city transport, logistic technologies and their application using various transport modus.	KZ	3
17TGA	Graph Theory and its Applications in Transport Basic terms of graph theory, paths in graphs, flows in networks, location problems, design problems on graphs, optimum routing, use of graphs in other scientific disciplines.	Z,ZK	4
18MTY	Materials Science and Engineering Basic course of materials science and engineering explains mechanical properties of structural materials based on their bonding forces and microstructure. However the main attention is paid to metals as the most important engineering materials, also other major classes of materials are presented, namely ceramics, polymers and composites. Attention is also paid to degradation processes in materials, to defectoscopy and to main mechanical tests.	Z,ZK	3
18PZP	Elasticity and Strength Tension and compression. Bending of beam. Shear stress during bending of beam. Design and analysis of cross section of beam. Design of riveted, bolted and welded joint of structure. Analysis of deflection curve of beam. Torsion of circle cross section. Combined loading. Stability of compressed bar and buckling. Beam on elastic foundation. Strength analysis.	Z,ZK	3

18SAT	<b>Structural Analysis</b> General system of forces in plane and space. Calculation of reactions of bodies and structures. Assessment of internal forces on statically determinate beams and simple girders. Principle of virtual work. Kinematic method for calculation of reactions of statically determinate systems. Determination of axial forces in truss constructions. Cross-sectional characteristics of planar shapes. Fiber polygons and chains.	Z,ZK	4
18TED	<b>Technical Documentation</b> Technical standards, international standardization, technical drawings, representation of technical objects, technical diagrams and charts, dimensional and geometrical accuracy, arrangement of drawing sheets.	KZ	2
20SYSA	<b>Systems Analysis</b> Introduction to system sciences, system viewpoint, terminology, typical system analysis tasks, system identification, system interface and interface tasks, processes, system behaviour and its analysis, strong functions and processes, genetic code, system identity, system architecture. Tools for system analysis - Petri nets, decision tables, algorithms for structural tasks. Soft and hard systems, methods for soft system analysis.	Z,ZK	5
20UITS	<b>Introduction to Intelligent Transport Systems</b> Terminology and legislative framework telematics systems and their architecture. Telematics systems in practice and their operation. Fundamentals of information and telecommunication systems for ITS. Principles and technical support measurement of traffic data, localization and navigation. Practical work with traffic data. Real examples of possible applications of the principles of ITS.	Z,ZK	7
21ZALD	<b>Basics of Air Transport</b> History, definitions, terminology, basic rules. VFR/IFR. Basics of aerodynamics. Propulsion of aircraft. Aircraft design. Basics of navigation, radio navigation. Weight, balance, performance. Flight planning, optimization of speed and heights, minimum fuel. Limitations of operation, maintenance, service life of aircraft. Traffic management, ground handling, security. Air crew. Airlines and economics. Space technologies.	KZ	2
23BDIS	<b>Safety Technologies of Transportation and Information Systems</b> Safety of transportation means - principles, testing, evaluation. Safety of infrastructures, critical structures, crisis scenarios. Safety of information systems and their robustness.	KZ	3
TV-1	<b>Physical Education</b>	Z	1
TV-2	<b>Physical Education</b>	Z	1

For updated information see <http://bilakniha.cvut.cz/en/FF.html>

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