

# Study plan

## Name of study plan: 1.blok bak.prez.04/05začátek

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: 120

Elective courses credits: 0

Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses

Minimal number of credits of the block: 112

The role of the block: Z

Code of the group: 1.S.BP 04/05

Name of the group: 1.sem.bak.prez.od04/05

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 at least 7 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
11ATGR	<b>Algebra and Graph Theory</b>	Z,ZK	5	2+2	Z	z
11GMR	<b>Geometry</b>	Z,ZK	5	2+2		z
11MTA1	<b>Mathematical Analysis 1</b>	Z,ZK	6	2+3		z
18TECD	<b>Technical Documentation</b>	KZ	3	2+1		z
14TETK	<b>Text Editors and Spreadsheets</b>	KZ	3	0+2		z
15TVC1	<b>Physical Education 1</b>	Z	1	0+2		z
12ZDIR	<b>Introduction to Transportation Engineering</b>	Z,ZK	5	2+2		z

### Characteristics of the courses of this group of Study Plan: Code=1.S.BP 04/05 Name=1.sem.bak.prez.od04/05

11ATGR	Algebra and Graph Theory	Z,ZK	5	Vector spaces, vectors, linear independence, bases. Matrices, rank, trace, linear mapping, special matrices. System of linear equation. Eigenvectors and eigenvalues of matrices, similar matrices, the characteristic matrix and characteristic polynomial of a matrix. Quadratic forms - diagonal form, associated symmetric matrix, signature, Sylvester's Inertia Law. Basic definitions of Graph Theory (oriented graphs, walk, trail, path, cycle, trees).
11GMR	Geometry	Z,ZK	5	Topographic surfaces, Orthogonal projection, axonometric projection (orthogonal axonometry, skew projection), perspective projection, curves - conic sections, examples of plane curves, basics of differential geometry of curves: parameterization, arc of the the curve, torsion and curvature, Frenet's trihedron, surfaces of revolution, quadrics, ruled quadrics, etc.
11MTA1	Mathematical Analysis 1	Z,ZK	6	Real and complex numbers. Sequences, real function of real variable, composite and inverse functions, limits, continuity, derivatives, differentials, investigation of functions for their properties. Integral calculus of functions of one variable with applications. Solution of ordinary differential equations, separation of variables.
18TECD	Technical Documentation	KZ	3	
14TETK	Text Editors and Spreadsheets	KZ	3	Basic principles of work on the Faculty of transportation's network, operating systems bases, text editor MS WORD, writing and text editing, processing of large documents, MS EXCEL spreadsheet, work with data, calculating operations, graphs, multidimensional tables, connection with text editor.
15TVC1	Physical Education 1	Z	1	The Department of Physical Education provides instruction in a wide variety of sports and games both in regular courses during the term and in winter and summer sport courses. Included are volleyball, basketball, football, tennis, table tennis, athletics, canoeing, orienteering, skiing, gymnastics, bodybuilding, squash, golf etc. The department closely cooperates with the Academic Sport Association of the Faculty of Civil Engineering in the field of recreational and competitive sport.
12ZDIR	Introduction to Transportation Engineering	Z,ZK	5	Sort of traffic, basic parameter, development traffic system, safety traffic. Relation traffic and territory. Traffic planning. Traffic research and measurement. Prognostication traffic. Regulation and organization traffic. Segregation and integration city traffic. Territorial scheduling.

Code of the group: 2.S.BP 04/05

Name of the group: 2.sem.bak.prez.04/05

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 at least 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
11FZ1	Physics 1	Z,ZK	5	2+2		Z
14KPP1	Computer Aided Design 1 (AutoCAD Basic Steps)	KZ	3	0+2		Z
18KKM	Metals and Metal Materials	Z,ZK	3	2+1		Z
13MT	Macroeconomic Theory	ZK	3	2+0		Z
11MTA2	Mathematical Analysis 2	Z,ZK	4	2+2		Z
18S	Statics	Z,ZK	4	2+1		Z
15TVC2	Physical Education 2	Z	1	0+2		Z
17ZKP	Introduction to Law	KZ	2	2+0		Z
16UDM	Introduction to Transportation and Manipulation Technology	ZK	3	2+0		Z

**Characteristics of the courses of this group of Study Plan: Code=2.S.BP 04/05 Name=2.sem.bak.prez.04/05**

11FZ1	Physics 1 Kinematics. Dynamics of Particle, Systems of Particles and Rigid Body. Solids and Fluids. Thermodynamics. Electric Field.	Z,ZK	5			
14KPP1	Computer Aided Design 1 (AutoCAD Basic Steps) Determination of "CAD Systems" term. CAD task in system projecting model. Concurrent CAD system in Czech market. Basic AutoCAD course in 2D environment, user settings, output options, designs with grid background.	KZ	3			
18KKM	Metals and Metal Materials	Z,ZK	3			
13MT	Macroeconomic Theory The aim of this course is to obtain an understanding of basic macroeconomic relations and to give the orientation in the topics of macroeconomic policy. The analysis of monetary and fiscal instruments of macroeconomic policy in the context of contemporary economic thought is included in the structure of the course. The students also have the occasion to understand the problems of money markets, the banking sector, inflation, unemployment and labour markets, government budget, exchange rates and international trade.	ZK	3			
11MTA2	Mathematical Analysis 2 Metric spaces, sequences in metric spaces, limit of sequence in metric space. Differential calculus of functions of several variables, differential of function, partial derivations, implicitly defined functions, extremes of functions of several variables. Integral calculus of function of several variables, Riemann integral in $R_n$ , integral over curves and surfaces in $R^3$ , application of integral calculus in physics.	Z,ZK	4			
18S	Statics	Z,ZK	4			
15TVC2	Physical Education 2 The Department of Physical Education provides instruction in a wide variety of sports and games both in regular courses during the term and in winter and summer sport courses. Included are volleyball, basketball, football, tennis, table tennis, athletics, canoeing, orienteering, skiing, gymnastics, bodybuilding, squash, golf etc. The department closely cooperates with the Academic Sport Association of the Faculty of Civil Engineering in the field of recreational and competitive sport.	Z	1			
17ZKP	Introduction to Law Theoretical foundations of law. The rule of law. Constitutional law. Public law. Substantive and procedural civil law. Commercial law. Trading business. Building permit procedure. Criminal and violation law. Law of nations, European Union and community law.	KZ	2			
16UDM	Introduction to Transportation and Manipulation Technology Transportation and handling technology in time continuity. Transportation systems and means of transport, infrastructure and division. Principles, functions and arrangement of overland railway and road means of transportation. Heat engines and their concept. Electric engines. Power transmission and its characteristics. Non-overland means of transportation. River- and sea- vessels, transporter airplanes and their drive units; principles and methods of solution. Handling and lifting systems, sorting. Systems for depositing and storing. Basic concepts and terminology. This subject contains excursions as well.	ZK	3			

Code of the group: 3.S.BP 05/06

Name of the group: 3.sem.bak.prez.od05/06

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 at least 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
11DADR	Differential and Difference Equations	Z,ZK	3	2+1	Z	Z
17DSP	Transportation and Communication Law	ZK	2	2+0		Z
11FZ2	Physics 2	Z,ZK	5	2+2	Z	Z

18KD	<b>Kinematics and Dynamics</b>	Z,ZK	4	2+1		Z
14SIAW	<b>Internet Services and WWW Pages Design</b>	KZ	3	1+1		Z
18SMT	<b>Special Materials and Technologies</b>	Z,ZK	3	2+1		Z
20ZET	<b>Foundations of Electrical Engineering</b>	KZ	3	2+1		Z
12ZTRS	<b>Railway Lines and Stations</b>	Z,ZK	5	2+2		Z

**Characteristics of the courses of this group of Study Plan: Code=3.S.BP 05/06 Name=3.sem.bak.prez.od05/06**

11DADR	Differential and Difference Equations	Z,ZK	3			
Ordinary differential equations of the first order and some methods of their solution. Differential equations of the n-th order, linear differential equations. System of the linear differential equations. Difference equations, linear difference equations and their systems. Cauchy and boundary value problem, Fourier series and Fourier transform. equations. Discrete dynamic systems.						
17DSP	Transportation and Communication Law	ZK	2			
11FZ2	Physics 2	Z,ZK	5			
Electric Current. Magnetic Field. Faraday's Law. Electromagnetic Field. Maxwell's Equations. Light. Geometric and Physical Optics. Quantization of Electromagnetic Radiation. Interaction of Radiation with Matter. Quantization. Hydrogen atom. Many-Electrons Atoms. Properties of Nuclei.						
18KD	Kinematics and Dynamics	Z,ZK	4			
14SIAW	Internet Services and WWW Pages Design	KZ	3			
Orientation and information searching in Internet environment, ability of communication through Internet and basic knowledge of own WWW presentation by help of WWW sides.						
18SMT	Special Materials and Technologies	Z,ZK	3			
20ZET	Foundations of Electrical Engineering	KZ	3			
Basic terms of electrical engineering, analysis of linear circuits with resistors, inductors and capacitors supplied with DC/AC sources, including transient phenomena. Basic electrical measurements. Energy sources, transformers, converters, rotary machines (DC, AC, asynchronous, synchronous, step motors). Safety at work with electrical installation (electrical engineering qualification).						
12ZTRS	Railway Lines and Stations	Z,ZK	5			
Growth of railway network, railway line velocity's improvement. Railway network's and high-speed railway lines' modernization. Vehicles and tracks, traction. Geometrical setting of tracks, structure clearance. Railway lines' and stations' scheme. Railway lines construction, substructure and permanent way, point switch. Ecological aspects of railway traffic.						

Code of the group: 4.S.BP 05/06

Name of the group: 4.sem.bak.prez.05/06

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 at least 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
15BP	<b>Work Safety and Health Protection in Transportation</b>	KZ	1	1+0		Z
16DPP	<b>Transport Vehicles</b>	ZK	3	2+0		Z
13MI	<b>Microeconomic Theory</b>	Z,ZK	3	2+1		Z
11PST	<b>Probability</b>	KZ	3	2+1		Z
12PK	<b>Communications Design</b>	KZ	3	1+2		Z
18PP	<b>Strength and Elasticity</b>	Z,ZK	4	2+2		Z
20ZEN	<b>Foundations of Electronics</b>	Z,ZK	4	2+1		Z
14UPG	<b>Introduction into Programming</b>	KZ	3	0+2		Z
14UZS	<b>Introduction into Interlocking and Communication Technology</b>	Z,ZK	4	2+1		Z

**Characteristics of the courses of this group of Study Plan: Code=4.S.BP 05/06 Name=4.sem.bak.prez.05/06**

15BP	Work Safety and Health Protection in Transportation	KZ	1			
Fundamental legislature, terms definition, risks and possible health damage, working conditions and health protection - focus on the field of Transportation. Health protection policies and health insurance for foreign business trips, statistics, working practice.						
16DPP	Transport Vehicles	ZK	3			
Common parts of means of transport. Transportation and ecology. Characteristics of combustion engines. Track vehicles of railway, city and subway. Leading properties of track vehicles and anti-derail safety. Automobiles; undercarriage, chassis, power transmission, conversion systems, wheel geometry. River- and sea- vessels, stability. Transporter airplanes, devices for buoyancy - and resistance - raise, control. Jet engines. Helicopters. Terminology. This subject contains excursions as well.						
13MI	Microeconomic Theory	Z,ZK	3			
The subject contains a complete commentary on one of two parts of the basic economic theory - microeconomics. In the introduction there are explained issues of microeconomics and the basic market categories and their connections. Furthermore there are provided analyses of the behaviour of basic economic subjects on the market of goods and services, later on the market of the factors of production with the following characteristics of individual prerequisite for follow-up studies of applied economics.						
11PST	Probability	KZ	3			
Descriptive statistics: introduction to the basic problems of statistics, organizing data, graphical methods of data presentation, numerical presentation of data, measures of location or central tendency. Basic probability concepts: elementary events and events, definitions and interpretation of probability, axioms of probability theory, probability properties, conditional probability and independence, Bayes theorem. Random variable, probability distribution, probability mass and density, moments, some discrete and continuous distributions. Approximations of distributions, independence of variables. Random vectors: joint and marginal distributions, mean vector, covariance matrix. Mixed distributions, mixture of distributions. Law of large numbers, Central limit theorem.						

12PK	Communications Design	KZ	3
Basic requirements transport in traffic ways. Fundamental projection carriage road, directive and high circuit. Air and water transport. Crossing road communication. Railway station. Building city transport. Development traffic infrastructure. Bridges and tunnels.			
18PP	Strength and Elasticity	Z,ZK	4
Simple tension and compression. Plane and space state of stress. Pure shear. Strength theories. Plane bending. Torsion in rods of circular and annual cross - sections. Combined stresses. Stability of pressed bars. Basic theory of fatigue. Dynamic loads.			
20ZEN	Foundations of Electronics	Z,ZK	4
Diodes, transistors (bipolar, unipolar, IGBT), thyristors, problems of switching components, operational amplifiers, harmonic and non-harmonic signals generation, sources, electrical line on higher frequencies and A/D and D/A converters. Digital logical circuits including microprocessors.			
14UPG	Introduction into Programming	KZ	3
Introduction to task algorithmization. Acquaintance with basic programming language types. Basic commands, expressions and functions of the C programming language. Practical realization of simple programmes in some of higher programming languages (Turbo C).			
14UZS	Introduction into Interlocking and Communication Technology	Z,ZK	4
Introductory course on:&lt;br>\nbasic concepts and knowledge from the areas of interlocking and telecommunication technologies and systems, as well as the basics of the post - office automation.			

Name of the block: Jazyky

Minimal number of credits of the block: 8

The role of the block: J

Code of the group: J1B-B.OD03/04-P+K.

Name of the group: Jazyk 1.bl.bak.od 03/04-prez.+kombin.

Requirement credits in the group: In this group you have to gain 8 credits

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

Credits in the group: 8

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
15J1A1	Foreign Language - English 1	Z	2	0+2		J
15JA1B	Foreign Language - English (exam 1)	ZK	0			J
15J1A2	Foreign Language - English 2	Z	2	0+2		J
15J1A3	Foreign Language - English 3	Z	2	0+2		J
15J1A4	Foreign Language - English 4	Z,ZK	2	0+2		J
15J1F1	Foreign Language - French 1	Z	2	0+2		J
15JF1B	Foreign Language - French (exam 1)	ZK	0			J
15J1F2	Foreign Language - French 2	Z	2	0+2		J
15J1F3	Foreign Language - French 3	Z	2	0+2		J
15J1F4	Foreign Language - French 4	Z,ZK	2	0+2		J
15J1N1	Foreign Language - German 1	Z	2	0+2		J
15JN1B	Foreign Language - German (exam 1)	ZK	0			J
15J1N2	Foreign Language - German 2	Z	2	0+2		J
15J1N3	Foreign Language - German 3	Z	2	0+2		J
15J1N4	Foreign Language - German 4	Z,ZK	2	0+2		J
15J1R1	Foreign Language - Russian 1	Z	2	0+2		J
15JR1B	Foreign Language - Russian (exam 1)	ZK	0			J
15J1R2	Foreign Language - Russian 2	Z	2	0+2		J
15J1R3	Foreign Language - Russian 3	Z	2	0+2		J
15J1R4	Foreign Language - Russian 4	Z,ZK	2	0+2		J
15J1S1	Foreign Language - Spanish 1	Z	2	0+2		J
15JS1B	Foreign Language - Spanish (exam 1)	ZK	0			J
15J1S2	Foreign Language - Spanish 2	Z	2	0+2		J
15J1S3	Foreign Language - Spanish 3	Z	2	0+2		J
15J1S4	Foreign Language - Spanish 4	Z,ZK	2	0+2		J

Characteristics of the courses of this group of Study Plan: Code=J1B-B.OD03/04-P+K. Name=Jazyk 1.bl.bak.od 03/04-prez.+kombin.





15J1S4	Foreign Language - Spanish 4	Z,ZK	2
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The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues. Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study. Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.

### List of courses of this pass:

Code	Name of the course	Completion	Credits
11ATGR	<b>Algebra and Graph Theory</b> Vector spaces, vectors, linear independence, bases. Matrices, rank, trace, linear mapping, special matrices. System of linear equation. Eigenvectors and eigenvalues of matrices, similar matrices, the characteristic matrix and characteristic polynomial of a matrix. Quadratic forms - diagonal form, associated symmetric matrix, signature, Sylvester's Inertia Law. Basic definitions of Graph Theory (oriented graphs, walk, trail, path, cycle, trees).	Z,ZK	5
11DADR	<b>Differential and Difference Equations</b> Ordinary differential equations of the first order and some methods of their solution. Differential equations of the n-th order, linear differential equations. System of the linear differential equations. Difference equations, linear difference equations and their systems. Cauchy and boundary value problem, Fourier series and Fourier transform. equations. Discrete dynamic systems.	Z,ZK	3
11FZ1	<b>Physics 1</b> Kinematics. Dynamics of Particle, Systems of Particles and Rigid Body. Solids and Fluids. Thermodynamics. Electric Field.	Z,ZK	5
11FZ2	<b>Physics 2</b> Electric Current. Magnetic Field. Faraday's Law. Electromagnetic Field. Maxwell's Equations. Light. Geometric and Physical Optics. Quantization of Electromagnetic Radiation. Interaction of Radiation with Matter. Quantization. Hydrogen atom. Many-Electrons Atoms. Properties of Nuclei.	Z,ZK	5
11GMR	<b>Geometry</b> Topographic surfaces, Orthogonal projection, axonometric projection (orthogonal axonometry, skew projection), perspective projection, curves - conic sections, examples of plane curves, basics of differential geometry of curves: parameterization, arc of the the curve, torsion and curvature, Frenet's trihedron, surfaces of revolution, quadrics, ruled quadrics, etc.	Z,ZK	5
11MTA1	<b>Mathematical Analysis 1</b> Real and complex numbers. Sequences, real function of real variable, composite and inverse functions, limits, continuity, derivatives, differentials, investigation of functions for their properties. Integral calculus of functions of one variable with applications. Solution of ordinary differential equations, separation of variables.	Z,ZK	6
11MTA2	<b>Mathematical Analysis 2</b> Metric spaces, sequences in metric spaces, limit of sequence in metric space. Differential calculus of functions of several variables, differential of function, partial derivations, implicitly defined functions, extremes of functions of several variables. Integral calculus of function of several variables, Riemann integral in $R_n$ , integral over curves and surfaces in $R^3$ , application of integral calculus in physics.	Z,ZK	4
11PST	<b>Probability</b> Descriptive statistics: introduction to the basic problems of statistics, organizing data, graphical methods of data presentation, numerical presentation of data, measures of location or central tendency. Basic probability concepts: elementary events and events, definitions and interpretation of probability, axioms of probability theory, probability properties, conditional probability and independence, Bayes theorem. Random variable, probability distribution, probability mass and density, moments, some discrete and continuous distributions. Approximations of distributions, independence of variables. Random vectors: joint and marginal distributions, mean vector, covariance matrix. Mixed distributions, mixture of distributions. Law of large numbers, Central limit theorem.	KZ	3
12PK	<b>Communications Design</b> Basic requirements transport in traffic ways. Fundamental projection carriage road, directive and high circuit. Air and water transport. Crossing road communication. Railway station. Building city transport. Development traffic infrastructure. Bridges and tunnels.	KZ	3
12ZDIR	<b>Introduction to Transportation Engineering</b> Sort of traffic, basic parameter, development traffic system, safety traffic. Relation traffic and territory. Traffic planning. Traffic research and measurement. Prognostication traffic. Regulation and organization traffic. Segregation and integration city traffic. Territorial scheduling.	Z,ZK	5
12ZTRS	<b>Railway Lines and Stations</b> Growth of railway network, railway line velocity's improvement. Railway network's and high-speed railway lines' modernization. Vehicles and tracks, traction. Geometrical setting of tracks, structure clearance. Railway lines' and stations' scheme. Railway lines construction, substructure and permanent way, point switch. Ecological aspects of railway traffic.	Z,ZK	5
13MI	<b>Microeconomic Theory</b> The subject contains a complete commentary on one of two parts of the basic economic theory - microeconomics. In the introduction there are explained issues of microeconomics and the basic market categories and their connections. Furthermore there are provided analyses of the behaviour of basic economic subjects on the market of goods and services, later on the market of the factors of production with the following characteristics of individual prerequisite for follow-up studies of applied economics.	Z,ZK	3
13MT	<b>Macroeconomic Theory</b> The aim of this course is to obtain an understanding of basic macroeconomic relations and to give the orientation in the topics of macroeconomic policy. The analysis of monetary and fiscal instruments of macroeconomic policy in the context of contemporary economic thought is included in the structure of the course. The students also have the occasion to understand the problems of money markets, the banking sector, inflation, unemployment and labour markets, government budget, exchange rates and international trade.	ZK	3
14KPP1	<b>Computer Aided Design 1 (AutoCAD Basic Steps)</b> Determination of "CAD Systems" term. CAD task in system projecting model. Concurrent CAD system in Czech market. Basic AutoCAD course in 2D environment, user settings, output options, designs with grid background.	KZ	3
14SIAW	<b>Internet Services and WWW Pages Design</b> Orientation and information searching in Internet environment, ability of communication through Internet and basic knowledge of own WWW presentation by help of WWW sides.	KZ	3
14TETK	<b>Text Editors and Spreadsheets</b> Basic principles of work on the Faculty of transportation's network, operating systems bases, text editor MS WORD, writing and text editing, processing of large documents, MS EXCEL spreadsheet, work with data, calculating operations, graphs, multidimensional tables, connection with text editor.	KZ	3

14UPG	Introduction into Programming	KZ	3
Introduction to task algorithmization. Acquaintance with basic programming language types. Basic commands, expressions and functions of the C programming language. Practical realization of simple programmes in some of higher programming languages (Turbo C).			
14UZS	Introduction into Interlocking and Communication Technology	Z,ZK	4
Introductory course on:&lt;br&gt;\nbasic concepts and knowledge from the areas of interlocking and telecommunication technologies and systems, as well as the basics of the post-office automation.			
15BP	Work Safety and Health Protection in Transportation	KZ	1
Fundamental legislature, terms definition, risks and possible health damage, working conditions and health protection - focus on the field of Transportation. Health protection policies and health insurance for foreign business trips, statistics, working practice.			
15J1A1	Foreign Language - English 1	Z	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1A2	Foreign Language - English 2	Z	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1A3	Foreign Language - English 3	Z	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1A4	Foreign Language - English 4	Z,ZK	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1F1	Foreign Language - French 1	Z	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1F2	Foreign Language - French 2	Z	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1F3	Foreign Language - French 3	Z	2
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15J1F4	Foreign Language - French 4	Z,ZK	2
The students of the Faculty of Transportation Sciences study two foreign languages one after another at the Department of Humanities. These courses aim at providing sufficient knowledge to communicate about every-day matters but also to read and write and discuss professional and specialised issues.&lt;br&gt; Both gradually chosen language courses are ended with an exam (at the end of 4th and 8th semester; the TL (Air Traffic Control) specialisation students take an English exam only - at the end of 4th semester; the PP (Professional Pilot) specialisation students take two exams in English - at the end of 4th and 6th semester). Those students who want to apply for the Air Traffic specializations are recommended to enrol "English language" as their first choice. This is, however, not a guarantee for being excepted in the project study.&lt;br&gt; Our department provides courses in English, German, French and Russian at different levels. The courses are also taught in our multimedia laboratory.			
15J1N1	Foreign Language - German 1	Z	2
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15J1S4	Foreign Language - Spanish 4	Z,ZK	2
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15JA1B	Foreign Language - English (exam 1)	ZK	0
15JF1B	Foreign Language - French (exam 1)	ZK	0
15JN1B	Foreign Language - German (exam 1)	ZK	0
15JR1B	Foreign Language - Russian (exam 1)	ZK	0
15JS1B	Foreign Language - Spanish (exam 1)	ZK	0
15TVC1	Physical Education 1	Z	1
The Department of Physical Education provides instruction in a wide variety of sports and games both in regular courses during the term and in winter and summer sport courses. Included are volleyball, basketball, football, tennis, table tennis, athletics, canoeing, orienteering, skiing, gymnastics, bodybuilding, squash, golf etc. The department closely cooperates with the Academic Sport Association of the Faculty of Civil Engineering in the field of recreational and competitive sport.			
15TVC2	Physical Education 2	Z	1
The Department of Physical Education provides instruction in a wide variety of sports and games both in regular courses during the term and in winter and summer sport courses. Included are volleyball, basketball, football, tennis, table tennis, athletics, canoeing, orienteering, skiing, gymnastics, bodybuilding, squash, golf etc. The department closely cooperates with the Academic Sport Association of the Faculty of Civil Engineering in the field of recreational and competitive sport.			
16DPP	Transport Vehicles	ZK	3
Common parts of means of transport. Transportation and ecology. Characteristics of combustion engines. Track vehicles of railway, city and subway. Leading properties of track vehicles and anti-derail safety. Automobiles; undercarriage, chassis, power transmission, conversion systems, wheel geometry. River- and sea- vessels, stability. Transporter airplanes, devices for buoyancy - and resistance - raise, control. Jet engines. Helicopters. Terminology. This subject contains excursions as well.			
16UDM	Introduction to Transportation and Manipulation Technology	ZK	3
Transportation and handling technology in time continuity. Transportation systems and means of transport, infrastructure and division. Principles, functions and arrangement of overland railway and road means of transportation. Heat engines and their concept. Electric engines. Power transmission and its characteristics. Non-overland means of transportation. River- and sea- vessels, transporter airplanes and their drive units; principles and methods of solution. Handling and lifting systems, sorting. Systems for depositing and storing. Basic concepts and terminology. This subject contains excursions as well.			
17DSP	Transportation and Communication Law	ZK	2
17ZKP	Introduction to Law	KZ	2
Theoretical foundations of law. The rule of law. Constitutional law. Public law. Substantive and procedural civil law. Commercial law. Trading business. Building permit procedure. Criminal and violation law. Law of nations, European Union and community law.			
18KD	Kinematics and Dynamics	Z,ZK	4
18KKM	Metals and Metal Materials	Z,ZK	3
18PP	Strength and Elasticity	Z,ZK	4
Simple tension and compression. Plane and space state of stress. Pure shear. Strength theories. Plane bending. Torsion in rods of circular and annular cross - sections. Combined stresses. Stability of pressed bars. Basic theory of fatigue. Dynamic loads.			
18S	Statics	Z,ZK	4
18SMT	Special Materials and Technologies	Z,ZK	3
18TECD	Technical Documentation	KZ	3
20ZEN	Foundations of Electronics	Z,ZK	4
Diodes, transistors (bipolar, unipolar, IGBT), thyristors, problems of switching components, operational amplifiers, harmonic and non-harmonic signals generation, sources, electrical line on higher frequencies and A/D and D/A converters. Digital logical circuits including microprocessors.			
20ZET	Foundations of Electrical Engineering	KZ	3
Basic terms of electrical engineering, analysis of linear circuits with resistors, inductors and capacitors supplied with DC/AC sources, including transient phenomena. Basic electrical measurements. Energy sources, transformers, converters, rotary machines (DC, AC, asynchronous, synchronous, step motors). Safety at work with electrical installation (electrical engineering qualification).			

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

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