

Study plan

Name of study plan: PRE bak. studium oboru DOS roz azení v 20-21 (skok z 1. r.)

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Transportation Systems and Technology

Garantor of the study branch: doc. Ing. Ji í arský, Ph.D.

Program of study: Technology in Transportation and Telecommunications

Type of study: Bachelor full-time

Required credits: 124

Elective courses credits: 56

Sum of credits in the plan: 180

Note on the plan:

Name of the block: Semestrální projekt

Minimal number of credits of the block: 6

The role of the block: ZP

Code of the group: PROJ 20-21

Name of the group: projekty 20-21 (4., 5., 6. sem.)

Requirement credits in the group: In this group you have to gain 6 credits

Requirement courses in the group: In this group you have to complete 3 courses

Credits in the group: 6

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
615X31	Project 1	Z	2	0P+1C	L	ZP
620X31	Project 1	Z	2	0P+1C	L	ZP
612X31	Project 1 Zuzana arská, Dagmar Ko árková, Karolína Moudrá, Otakar Vacín, Ji í arský, Roman Dostál, Jan Gallia, Josef Kocourek, Petr Kumpošt,	Z	2	0P+1C	L	ZP
622X31	Project 1	Z	2	0P+1C	L	ZP
617X31	Project 1	Z	2	0P+1C	L	ZP
616X31	Project 1 Josef Mík, Petr Bouchner, Adam Orlický, Ond ej Smíšek, Zden k Svatý	Z	2	0P+1C	L	ZP
617X32	Project 2	Z	2	0P+2C	Z	ZP
622X32	Project 2	Z	2	0P+2C	Z	ZP
612X32	Project 2 Ji í arský, Josef Kocourek, Petr Kumpošt, Kristýna Neubergová, Tomáš Javo ík, Vladimír Pušman, Jaroslav Kácovský, Tomáš Pad lek	Z	2	0P+2C	Z	ZP
620X32	Project 2	Z	2	0P+2C	Z	ZP
615X32	Project 2	Z	2	0P+2C	Z	ZP
616X32	Project 2	Z	2	0P+2C	Z	ZP
616X33	Project 3	Z	2	0P+1C	L	ZP
620X33	Project 3	Z	2	0P+1C	L	ZP
615X33	Project 3	Z	2	0P+1C	L	ZP
612X33	Project 3 Ji í arský, Roman Dostál, Jan Gallia, Josef Kocourek, Petr Kumpošt, Libor Ládyš, Kristýna Neubergová, Tomáš Javo ík, Pavel Purkart,	Z	2	0P+1C	L	ZP
622X33	Project 3	Z	2	0P+1C	L	ZP
617X33	Project 3	Z	2	0P+1C	L	ZP

Characteristics of the courses of this group of Study Plan: Code=PROJ 20-21 Name=projekty 20-21 (4., 5., 6. sem.)

615X31	Project 1	Z	2
620X31	Project 1	Z	2
612X31	Project 1	Z	2

622X31	Project 1	Z	2
617X31	Project 1	Z	2
616X31	Project 1	Z	2
617X32	Project 2	Z	2
622X32	Project 2	Z	2
612X32	Project 2	Z	2
620X32	Project 2	Z	2
615X32	Project 2	Z	2
616X32	Project 2	Z	2
616X33	Project 3	Z	2
620X33	Project 3	Z	2
615X33	Project 3	Z	2
612X33	Project 3	Z	2
622X33	Project 3	Z	2
617X33	Project 3	Z	2

Name of the block: Compulsory courses

Minimal number of credits of the block: 118

The role of the block: Z

Code of the group: 1S PRE 20-21 P

Name of the group: 1. sem. bak. PRE 20-21 povinné p edm ty (spol. ást studia) - pro B3710

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 11 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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
611CAL1	Calculus 1 <i>Romana Zibnerová</i>	Z,ZK	7	2P+4C+2B	Z	z
611LA	Linear Algebra <i>Romana Zibnerová</i>	Z,ZK	3	2P+1C+10B	Z	z
612ZYDI	Introduction to Transportation Engineering <i>Dagmar Ko árková</i>	Z,ZK	2	1P+1C	Z	z
618MTY	Materials Science and Engineering <i>Vít Malinovský</i>	Z,ZK	3	2P+1C+10B	Z	z
611GIE	Geometry <i>Vít Malinovský</i>	KZ	3	2P+2C+12B	Z	z
614ASD	Algorithm and Data Structures <i>Jan Mejst ík</i>	KZ	3	0P+2C+8B	Z	z
614KSP	Constructing with Computer Aid <i>Libor Židek</i>	KZ	2	0P+2C+8B	Z	z
618TED	Technical Documentation <i>Vít Malinovský</i>	KZ	2	1P+1C+8B	Z	z
615DPLG	Transportation Psychology <i>Jana Štikarová, Tomáš Burian</i>	Z	2	2P+0C+6B	Z	z
616UDOP	Introduction into Vehicles <i>Josef Mík, Zuzana Radová</i>	Z	2	2P+0C+8B	Z	z
TV-1	Physical Education	Z	1		Z	z

Characteristics of the courses of this group of Study Plan: Code=1S PRE 20-21 P Name=1. sem. bak. PRE 20-21 povinné p edm ty (spol. ást studia) - pro B3710

611CAL1	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.
611LA	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.
612ZYDI	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.
618MTY	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.

611GIE	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.			
614ASD	Algorithm and Data Structures	KZ	3
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.			
614KSP	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).			
618TED	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.			
615DPLG	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.			
616UDOP	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: 2S PRE 20-21 P

Name of the group: 2. sem. bak. PRE 20-21 povinné p edm ty (spol. ást studia) - pro B3710

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
611CAL2	Calculus 2 Romana Zibnerová	Z,ZK	5	2P+3C+2B	L	Z
611STAT	Statistics Pavel Provinský	Z,ZK	4	2P+2C+12B	L	Z
612ZTS	Railway Lines and Stations Tomáš Javoík, Ondřej Trešl	Z,ZK	4	2P+2C+10B	L	Z
618SAT	Structural Analysis Petr Koudelka, Jan Šleichrt, Michaela Neuhäuserová	Z,ZK	4	2P+2C+14B	L	Z
620SYSA	Systems Analysis Martin Langr, Jiří Růžka, Petr Bureš, Patrik Horažovský	Z,ZK	5	2P+2C+14B	L	Z
614PRG	Programming Libor Židek	KZ	2	0P+2C+8B	L	Z
617TEDL	Transport Technology and Logistics Michal Drábek	KZ	3	2P+1C	L	Z
621ZALD	Basics of Air Transport Jakub Hospodka	KZ	2	0P+2C+8B	L	Z
TV-2	Physical Education	Z	1		L	Z

Characteristics of the courses of this group of Study Plan: Code=2S PRE 20-21 P Name=2. sem. bak. PRE 20-21 povinné p edm ty (spol. ást studia) - pro B3710

611CAL2	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.			
611STAT	Statistics	Z,ZK	4
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.			
612ZTS	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.			
618SAT	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.			
620SYSA	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.			

614PRG	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.			
617TEDL	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.			
621ZALD	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: 3S PRE 20-21 P

Name of the group: 3. sem. bak. PRE 20-21 povinné p edm ty (S S) - B3710

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 8 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
611FYZ	Physics Kurt Fišer	Z,ZK	5	2P+2C+18B	Z	z
612MDE	Transport Models and Transport Excesses Josef Kocourek, Tomáš Pad lek	Z,ZK	3	2P+1C+8B	Z	z
617TGA	Graph Theory and its Applications in Transport Josef Volek	Z,ZK	4	2P+2C+12B	Z	z
618PZP	Elasticity and Strength Jan Šleichrt, Tomáš Doktor	Z,ZK	3	2P+1C+10B	Z	z
620UITS	Introduction to Intelligent Transport Systems Vladimír Faltus	Z,ZK	7	3P+2C+20B	Z	z
612PPOK	Designing Roads, Highways and Motorways Jiří arský, Petr Kumpošt, Tomáš Pad lek	KZ	3	1P+2C+10B	Z	z
614DATS	Database Systems Ondřej Smlíšek	KZ	2	1P+1C+10B	Z	z
615JZ1A	Foreign Language - English 1 Vra Pastorková	Z	3	0P+4C+10B	Z	z

Characteristics of the courses of this group of Study Plan: Code=3S PRE 20-21 P Name=3. sem. bak. PRE 20-21 povinné p edm ty (S S) - B3710

611FYZ	Physics	Z,ZK	5
Kinematics, particle dynamics, dynamics of particle systems and rigid body. Continuum mechanics, thermodynamics.			
612MDE	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.			
617TGA	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.			
618PZP	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.			
620UITS	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.			
612PPOK	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.			
614DATS	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.			
615JZ1A	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.			

Code of the group: 4S P DOS 20-21 P

Name of the group: 4. sem. PREZ bak. DOS 20-21 povinné p edm ty

Requirement credits in the group: In this group you have to gain 20 credits

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

Credits in the group: 20

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
611MSP	Modeling of Systems and Processes <i>Marek Honc</i>	Z,ZK	4	2P+2C+12B	L	z
612SDK	Highways, Motorways and Intersections <i>Jiří arský</i>	Z,ZK	4	2P+2C	L	z
618KAD	Kinematics and Dynamics <i>Vít Malinovský</i>	Z,ZK	4	2P+1C	L	z
616DPY	Vehicle Technology <i>Josef Mík, P. emysl Toman</i>	KZ	5	2P+2C	L	z
615JZ2A	Foreign Language - English 2 <i>V. ra Pastorková</i>	Z,ZK	3	0P+4C+10B	L	z

Characteristics of the courses of this group of Study Plan: Code=4S P DOS 20-21 P Name=4. sem. PREZ bak. DOS 20-21 povinné p edm ty

611MSP	Modeling of Systems and Processes	Z,ZK	4	Mathematical methods and algorithms as a basis for system analysis. Methods for modelling and evaluating the systems in continuous and discrete time domain. Laplace transform, z-transform, and the recursive algorithms in solution of differential and difference equations, as an instrument for system description. Practical use of technical computing environment (MATLAB).		
612SDK	Highways, Motorways and Intersections	Z,ZK	4	Roads and motorways network, transport output. Types of direction curves. Hairpin bend. Stopping sight distance and overtaking sight distance. Levels of traffic service. Design elements of crossroads and intersections. Crossroads. Roundabouts. Intersections. Special types of junctions. Capacity of crossroads and intersections. Structure of pavement of roads and motorways. Road engineering structures. Assessment of route alternatives.		
618KAD	Kinematics and Dynamics	Z,ZK	4	Motion along a line, motion along a curve. Kinematics of rigid plane, kinematics of rigid body. Point mass kinematics, system of point masses. Point mass dynamics and system of point masses, equation of motion. Method of Newton. Principle of D'Alembert. Free and forced vibration with one degree of freedom. Viscous damping. Impact theory. Introduction to the solution of vibration with multiple degrees of freedom.		
616DPY	Vehicle Technology	KZ	5	Technical nomenclature in transportation technology. Vehicle in legislation. Design. Operation. Influence on environment. Vehicle and ecology. Traction engine characteristics - combustion engines, electric engines, change of energy principles. Powertrain construction. Power transmission.		
615JZ2A	Foreign Language - English 2	Z,ZK	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.		

Code of the group: 4S P DOS 20-21 PV1

Name of the group: 4. sem. bak. PRE DOS 20-21 povinné p edm ty-1.výb r

Requirement credits in the group: In this group you have to gain 4 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
611EMOP	Electromagnetic Field and Optics <i>Kurt Fišer</i>	Z,ZK	4	2P+2C	L	z
612DOPS	Traffic Surveys and Simulations <i>Petr Kumpošt, Libor Židek, Petr Richter</i>	Z,ZK	4	2P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=4S P DOS 20-21 PV1 Name=4. sem. bak. PRE DOS 20-21 povinné p edm ty-1.výb r

611EMOP	Electromagnetic Field and Optics	Z,ZK	4	Electric field. Electric current. Magnetic field. Electromagnetic field. Optics. Basics of solid-state physics.		
612DOPS	Traffic Surveys and Simulations	Z,ZK	4	Theory of traffic flow. Methods of monitoring - profile, spatially time. Automatic traffic counts. Security parameters - accidents, near-misses. Surveys in public transport. Overview of traffic microsimulation models. Getting to know the working environment applications. Explanation of movement of vehicles in the traffic system. Creating and simulation of microscopic traffic model. Evaluation of the output characteristics. 4D visualization model.		

Code of the group: 4S P DOS 20-21 PV2

Name of the group: 4. sem. bak. PRE DOS 20-21 povinné p edm ty-2.výb r

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
611MDS	Collection and Processing of Traffic Data Petr Bureš	KZ	2	2P+0C	L	z
618TK	Theory of Structures Vít Malinovský	KZ	2	2P+0C	L	z

Characteristics of the courses of this group of Study Plan: Code=4S P DOS 20-21 PV2 Name=4. sem. bak. PRE DOS 20-21 povinné p edm ty-2.výb r

611MDS	Collection and Processing of Traffic Data Basic principles of traffic detection and data collection, specific problems of the field of traffic data. Data preprocessing and analysis for use in additional applications.	KZ	2			
618TK	Theory of Structures Deformation in plane, principle of virtual work. Force (flexibility) method. Application of force method to frame analysis. Displacement (stiffness) method. Simplified and general stiffness method. Mathematical foundations of elasticity. Static analysis of complex statically indeterminate structure. Energy methods for beam analysis. Lagrange variational principle. Winkler model of elastic foundation. Pasternak model of elastic foundation.	KZ	2			

Code of the group: 4S P DOS 20-21 PV3

Name of the group: 4. sem. bak. PRE DOS 20-21 povinné p edm ty-3.výb r

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
614PPD	Computer Aid of Transportation Projecting Drahomír Schmidt	KZ	2	0P+2C	L	z
618POM	Advanced Materials Vít Malinovský	KZ	2	0P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=4S P DOS 20-21 PV3 Name=4. sem. bak. PRE DOS 20-21 povinné p edm ty-3.výb r

614PPD	Computer Aid of Transportation Projecting Overview of CAx application for transportation projecting aid. AutoCAD environment possibilities of basic tasks automatizing (programming, scripting, data exchange). Advanced blocks modification (attributes, relation to databases). Work in projecting group, external references. Basic tasks for communication projecting (clothoid transition curve, cross-and longitudinal section). Basics of 3D modelling.	KZ	2			
618POM	Advanced Materials The knowledge gained in primary materials course is further developed. In greater physical detail it explains dynamics of structure defects, phase diagrams of binary systems and other concepts. Special processes of structure control are discussed. The gained knowledge is utilized on description of contemporary technologies of material production for key industrial applications.	KZ	2			

List of courses of this pass:

Code	Name of the course	Completion	Credits
611CAL1	Calculus 1 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.	Z,ZK	7
611CAL2	Calculus 2 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.	Z,ZK	5
611EMOP	Electromagnetic Field and Optics Electric field. Electric current. Magnetic field. Electromagnetic field. Optics. Basics of solid-state physics.	Z,ZK	4
611FYZ	Physics Kinematics, particle dynamics, dynamics of particle systems and rigid body. Continuum mechanics, thermodynamics.	Z,ZK	5
611GIE	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

611LA	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.			
611MDS	Collection and Processing of Traffic Data	KZ	2
Basic principles of traffic detection and data collection, specific problems of the field of traffic data. Data preprocessing and analysis for use in additional applications.			
611MSP	Modeling of Systems and Processes	Z,ZK	4
Mathematical methods and algorithms as a basis for system analysis. Methods for modelling and evaluating the systems in continuous and discrete time domain. Laplace transform, z-transform, and the recursive algorithms in solution of differential and difference equations, as an instrument for system description. Practical use of technical computing environment (MATLAB).			
611STAT	Statistics	Z,ZK	4
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.			
612DOPS	Traffic Surveys and Simulations	Z,ZK	4
Theory of traffic flow. Methods of monitoring - profile, spatially time. Automatic traffic counts. Security parameters - accidents, near-misses. Surveys in public transport. Overview of traffic microsimulation models. Getting to know the working environment applications. Explanation of movement of vehicles in the traffic system. Creating and simulation of microscopic traffic model. Evaluation of the output characteristics. 4D visualization model.			
612MDE	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.			
612PPOK	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.			
612SDK	Highways, Motorways and Intersections	Z,ZK	4
Roads and motorways network, transport output. Types of direction curves. Hairpin bend. Stopping sight distance and overtaking sight distance. Levels of traffic service. Design elements of crossroads and intersections. Crossroads. Roundabouts. Intersections. Special types of junctions. Capacity of crossroads and intersections. Structure of pavement of roads and motorways. Road engineering structures. Assessment of route alternatives.			
612X31	Project 1	Z	2
612X32	Project 2	Z	2
612X33	Project 3	Z	2
612ZTS	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.			
612ZYDI	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.			
614ASD	Algorithm and Data Structures	KZ	3
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.			
614DATS	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.			
614KSP	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).			
614PPD	Computer Aid of Transportation Projecting	KZ	2
Overview of CAx application for transportation projecting aid. AutoCAD environment possibilities of basic tasks automatizing (programming, scripting, data exchange). Advanced blocks modification (attributes, relation to databases). Work in projecting group, external references. Basic tasks for communication projecting (clotoid transition curve, cross-and longitudinal section). Basics of 3D modelling.			
614PRG	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.			
615DPLG	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.			
615JZ1A	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.			
615JZ2A	Foreign Language - English 2	Z,ZK	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.			
615X31	Project 1	Z	2
615X32	Project 2	Z	2
615X33	Project 3	Z	2

616DPY	Vehicle Technology Technical nomenclature in transportation technology. Vehicle in legislation. Design. Operation. Influence on environment. Vehicle and ecology. Tractor engine characteristics - combustion engines, electric engines, change of energy principles. Powertrain construction. Power transmission.	KZ	5
616UDOP	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
616X31	Project 1	Z	2
616X32	Project 2	Z	2
616X33	Project 3	Z	2
617TEDL	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 mode, technologic factors of the side of operator and client, organisation of city transport, logistic technologies and their application using various transport modes.	KZ	3
617TGA	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
617X31	Project 1	Z	2
617X32	Project 2	Z	2
617X33	Project 3	Z	2
618KAD	Kinematics and Dynamics Motion along a line, motion along a curve. Kinematics of rigid plane, kinematics of rigid body. Point mass kinematics, system of point masses. Point mass dynamics and system of point masses, equation of motion. Method of Newton. Principle of D'Alembert. Free and forced vibration with one degree of freedom. Viscous damping. Impact theory. Introduction to the solution of vibration with multiple degrees of freedom.	Z,ZK	4
618MTY	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
618POM	Advanced Materials The knowledge gained in primary materials course is further developed. In greater physical detail it explains dynamics of structure defects, phase diagrams of binary systems and other concepts. Special processes of structure control are discussed. The gained knowledge is utilized on description of contemporary technologies of material production for key industrial applications.	KZ	2
618PZP	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
618SAT	Structural Analysis 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
618TED	Technical Documentation Technical standards, international standardization, technical drawings, representation of technical objects, technical diagrams and charts, dimensional and geometrical accuracy, arrangement of drawing sheets.	KZ	2
618TK	Theory of Structures Deformation in plane, principle of virtual work. Force (flexibility) method. Application of force method to frame analysis. Displacement (stiffness) method. Simplified and general stiffness method. Mathematical foundations of elasticity. Static analysis of complex statically indeterminate structure. Energy methods for beam analysis. Lagrange variational principle. Winkler model of elastic foundation. Pasternak model of elastic foundation.	KZ	2
620SYSA	Systems Analysis 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
620UITS	Introduction to Intelligent Transport Systems 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
620X31	Project 1	Z	2
620X32	Project 2	Z	2
620X33	Project 3	Z	2
621ZALD	Basics of Air Transport 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
622X31	Project 1	Z	2
622X32	Project 2	Z	2
622X33	Project 3	Z	2
TV-1	Physical Education	Z	1
TV-2	Physical Education	Z	1

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

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