Study plan

Name of study plan: Master Full-Time SC from 2025/26

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Smart Cities
Type of study: Follow-up master full-time
Required credits: 60
Elective courses credits: 0
Sum of credits in the plan: 60
Note on the plan:

Name of the block: Semestrální projekt
Minimal number of credits of the block: 8
The role of the block: ZP

Code of the group: XD-NP-SC-21/22
Name of the group: Thesis Master Full-Time SC from 2021/22
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 2 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)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
11XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
12XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
14XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
15XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
16XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
17XN1C-E	**Thesis 1** *Tomáš Horák, Miroslav Svítek*	Z	4	0P+4C	Z	ZP
18XN1C-E	**Thesis 1** *Afdhal Afdhal*	Z	4	0P+4C	Z	ZP
20XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
21XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
22XN1C-E	**Thesis 1**	Z	4	0P+4C	Z	ZP
11XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
12XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
14XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
15XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
16XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
17XN2C-E	**Thesis 2** *Tomáš Horák, Miroslav Svítek*	Z	4	0P+4C	L	ZP
18XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
20XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
21XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP
22XN2C-E	**Thesis 2**	Z	4	0P+4C	L	ZP

Characteristics of the courses of this group of Study Plan: Code=XD-NP-SC-21/22 Name=Thesis Master Full-Time SC from 2021/22

11XN1C-E	Thesis 1	Z	4
12XN1C-E	Thesis 1	Z	4
14XN1C-E	Thesis 1	Z	4

15XN1C-E	Thesis 1	Z	4
16XN1C-E	Thesis 1	Z	4
17XN1C-E	Thesis 1	Z	4
18XN1C-E	Thesis 1	Z	4
20XN1C-E	Thesis 1	Z	4
21XN1C-E	Thesis 1	Z	4
22XN1C-E	Thesis 1	Z	4
11XN2C-E	Thesis 2	Z	4
12XN2C-E	Thesis 2	Z	4
14XN2C-E	Thesis 2	Z	4
15XN2C-E	Thesis 2	Z	4
16XN2C-E	Thesis 2	Z	4
17XN2C-E	Thesis 2	Z	4
18XN2C-E	Thesis 2	Z	4
20XN2C-E	Thesis 2	Z	4
21XN2C-E	Thesis 2	Z	4
22XN2C-E	Thesis 2	Z	4

Name of the block: Compulsory courses in the program
Minimal number of credits of the block: 50
The role of the block: P

Code of the group: 1S-NP-SC-21/22
Name of the group: 1st Sem. Master Full-Time SC from 2021/22
Requirement credits in the group: In this group you have to gain 24 credits
Requirement courses in the group: In this group you have to complete 4 courses
Credits in the group: 24
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
17SCF-E	**Smart Cities Fundamentals** *Tomáš Horák, Miroslav Svítek*	Z,ZK	6	3P+2C	Z	P
17TSC-E	**Technologies for Smart Cities** *Tomáš Horák, Miroslav Svítek Tomáš Horák (Gar.)*	Z,ZK	6	3P+2C	Z	P
20AIMI-E	**Application of ITS in Urban Engineering** *Dagmar Kočárková, Josef Kocourek, Josef Filip, Jiří Růžička, Tomáš Tichý* ***Tomáš Tichý***	Z,ZK	6	3P+3C	Z	P
20GINS-E	**Geographical, information, localization and navigation systems** *Petr Bureš, František Kekula, Pavel Hrubeš, Zuzana Purkrábková* ***Pavel Hrubeš***	Z,ZK	6	3P+3C	Z	P

Characteristics of the courses of this group of Study Plan: Code=1S-NP-SC-21/22 Name=1st Sem. Master Full-Time SC from 2021/22

17SCF-E	Smart Cities Fundamentals	Z,ZK	6
The main smart city components will be described (intelligent transport systems, smart grids, smart buildings, smart lighting, e-governance, etc.) together with their integration methods by using existing international standards to achieve the synergies among different sectors. The quality of life for different city residents is understood as the main criterial function.			
17TSC-E	Technologies for Smart Cities	Z,ZK	6
Each presented technology will be described through performance parameters like safety, reliability, integrity, continuity, etc. New business models of technologies' implementation and operation will be introduced to provide advanced deployment decision-making. Legal aspects of technologies' assessment (e.g. GDPR) will be presented for selected application areas.			
20AIMI-E	Application of ITS in Urban Engineering	Z,ZK	6
The course focuses mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization of the public space, concept of public space solutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, MHD, cyclo, modes etc. New approaches to the development of Smart and green approaches Promoting into Public.			
20GINS-E	Geographical, information, localization and navigation systems	Z,ZK	6
The subject is specialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of transport and telecommunication. It introduces students to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitization methods, and a number of other GIS related technologies such as problem mapping, webmap, etc.			

Code of the group: 2S-NP-SC-25/26
Name of the group: 2nd Sem. Master Full-Time SC from 2025/26
Requirement credits in the group: In this group you have to gain 23 credits
Requirement courses in the group: In this group you have to complete 6 courses
Credits in the group: 23

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
11SMCD-E	**Smart Cities Design** *Ondřej Přibyl, Roman Dostál, Jakub Veselka, Michal Matowicki, Jana Kuklová* ***Jana Kuklová*** *Ondřej Přibyl (Gar.)*	Z,ZK	6	3P+2C	L	P
14CISC-E	**Cyber Infrastructure for Smart Cities** *Tomáš Zelinka, Martin Šrotýř, Zdeněk Lokaj, Miroslav Vaniš* ***Tomáš Zelinka*** *Tomáš Zelinka (Gar.)*	Z,ZK	3	2P+1C	L	P
17SCAR-E	**Sustainable Cities and Regions** *Tomáš Horák, Miroslav Svítek, Karel Maier Tomáš Horák (Gar.)*	Z,ZK	3	2P+1C	L	P
17SU-E	**Smart Urbanism** *Jakub Vorel Jakub Vorel (Gar.)*	Z,ZK	6	2P+3C	L	P
17FCL-E	**Future Cities Laboratory** ***Miroslav Svítek***	KZ	3	0P+3C	L	P
17PJMG-E	**Project Management** *Alena Rybičková, Eliška Glaserová Alena Rybičková (Gar.)*	KZ	2	2P+0C	L	P

Characteristics of the courses of this group of Study Plan: Code=2S-NP-SC-25/26 Name=2nd Sem. Master Full-Time SC from 2025/26

11SMCD-E	Smart Cities Design	Z,ZK	6
Introduction to smart cities, systém analysis and design fundamentals, usage of UML for system design, principles of complex systems, modeling using multiagent systems in the SW environment AnyLogic, application on a small scale real world problem.			
14CISC-E	Cyber Infrastructure for Smart Cities	Z,ZK	3
Status quo and trends in telecommunications systems applied in cyber infrastructure, technical, economical and legal aspects of telecommunications networks design and services provisioning, identification and quantification of hiererchical telecommunications networks and services performance, telecommunication services dedicated for transport and specifically Smart Cities solutions.			
17SCAR-E	Sustainable Cities and Regions	Z,ZK	3
Cities in antiquity and in the middle ages, renaissance ideal of a perfect city, 19. and 20. century cities, modern city planning, sustainability as a concept, historical development of transportation in cities, modern transportation systems, logistics as a concept, supply chain, logistics center, city logistics.			
17SU-E	Smart Urbanism	Z,ZK	6
Urban metabolism and ecology, urban morphology and land use, urban society: demography, mobility, social transtition, urban space and places, urban flows, urban modeling, impact of technology innovations on urban transition.			
17FCL-E	Future Cities Laboratory	KZ	3
Future cities system architecture (with focus on C-ITS) and reference projects, functional and technology solutions description and principles, wireless telco solutions dedicated for C-ITS systems (ITS-G5, LTE-V, etc.), security architecture, data security and personal data protection, testing of the systems and functional parameters assessment, technical properties evaluaiton, methods of data collection and processing.			
17PJMG-E	Project Management	KZ	2
Basic terms of the project management, project management standards, organizational structures and processess in the project management, life-cycle of the project, risk analysis, projects in transport and transport infrastructure and their specifics, feasibility study and CBA, project evaluation, PPP projects.			

Code of the group: 2S-NP-SC-V-21/22
Name of the group: 2st Sem. Master Full-Time Alternative SC from 2021/22
Requirement credits in the group: In this group you have to gain 3 credits
Requirement courses in the group: In this group you have to complete 1 course
Credits in the group: 3
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
16SHMI-E	**Simulation and HMI** *Stanislav Novotný, Petr Bouchner, Tereza Kunclová, Michal Cenkner Stanislav Novotný (Gar.)*	Z,ZK	3	2P+1C	L	P
17AMOL-E	**Application of Operations Research Methods in Logistics** *Alena Rybičková, Šárka Voráčová Alena Rybičková (Gar.)*	Z,ZK	3	2P+1C	L	P

Characteristics of the courses of this group of Study Plan: Code=2S-NP-SC-V-21/22 Name=2st Sem. Master Full-Time Alternative SC from 2021/22

16SHMI-E	Simulation and HMI	Z,ZK	3
Simulation for the systems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for ITS. Simulation theory with application of computing equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle dynamics, on-land carriage in particular. Virtual reality systems.			
17AMOL-E	Application of Operations Research Methods in Logistics	Z,ZK	3
Exact, heuristic, metaheuristic methods. Static and dynamic shortest path problem. Location analysis, P&R/K&R facilities location. Travelling salesman problem with constraints. Assignment problem and matching algorithms. Decision making in urban transport. Design of urban transport lines. Scheduling in public transport.			

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 2

The role of the block: PV

Code of the group: 1S-NP-SC-FA-20/21
Name of the group: 1st Sem. Master Full-Time Alternative SC from 2020/21
Requirement credits in the group: In this group you have to gain at least 2 credits (at most 7)
Requirement courses in the group: In this group you have to complete at least 1 course (at most 3)
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
500EKL3	**Ecology III - Social Ecology** *Petr Klápště* ***Petr Klápště*** *Petr Klápště (Gar.)*	KZ	2	2P+0C	Z	PV
500U3	**Urbanism III - Theory**	ZK	2	1P+1C	Z	PV
555UP1	**Planning 1 - Urban Planning** *Karel Maier, Jakub Vorel, Petr Klápště, Vít Řezáč* ***Jakub Vorel*** *Jakub Vorel (Gar.)*	ZK	3	2P+1C	Z	PV

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

500EKL3	Ecology III - Social Ecology	KZ	2

Social Ecology: The subject deals with the relationship of man and the environment in landscape and settlements. It acquaints students with selected methods of socio-ecological research and participation of citizens in the formation of the rural environment, the city and its socio-spatial structure. The theoretical part of the subject is based on concrete practical examples, which are processed by the students and present them during the semester.

500U3	Urbanism III - Theory	ZK	2

Sustainable development is the governing paradigm of the 21st century. It has long been at the heart of most urban development debates. We are increasingly aware that providing a good quality of life is the right of even the most vulnerable social groups, as the environment directly affects their health. This paradigm shift requires a more holistic approach to urban development. The question remains, how can it be successfully implemented in practice? What kind of urban theories can we use to ensure this development? The subject introduces the student to the most important urban theories of the 20th and 21st centuries. It shows the emergence and transformation of urban development debates, theories and experiments against the background of their social and economic development. Students are guided to develop their critical thinking: to recognise, analyse, evaluate and understand the impact of urban theories on the city through concrete case studies.

555UP1	Planning 1 - Urban Planning	ZK	3

In the course of Urban Planning I, we teach students on how the cities were planned from ancient times to the present and how discipline itself have evolved in the course of time. By using the real examples, we describe urban planning as a complex process with numerous feedbacks that evolves in time and involves various actors with different values and interests and resources. The course presents general principles and concepts of European spatial planning and planning system in the Czech Republic providing students with practical insight into relevant planning documents, legislation and institutions. Special lectures focus on actual topics: planning of urban ecosystems and participatory planning. At the end of the semester students will be evaluated based on the presentation and discussion of their seminar work via TEAMS or in classroom. In their seminar works students will analyse and critically evaluate selected case of planning process in one of the following domains: Urban mobility, Housing, Public services, Ecosystems, Economic activities, Cultural heritage.

List of courses of this pass:

Code	Name of the course	Completion	Credits
11SMCD-E	Smart Cities Design	Z,ZK	6
Introduction to smart cities, systém analysis and design fundamentals, usage of UML for system design, principles of complex systems, modeling using multiagent systems in the SW environment AnyLogic, application on a small scale real world problem.			
11XN1C-E	Thesis 1	Z	4
11XN2C-E	Thesis 2	Z	4
12XN1C-E	Thesis 1	Z	4
12XN2C-E	Thesis 2	Z	4
14CISC-E	Cyber Infrastructure for Smart Cities	Z,ZK	3
Status quo and trends in telecommunications systems applied in cyber infrastructure, technical, economical and legal aspects of telecommunications networks design and services provisioning, identification and quantification of hiererchical telecommunications networks and services performance, telecommunication services dedicated for transport and specifically Smart Cities solutions.			
14XN1C-E	Thesis 1	Z	4
14XN2C-E	Thesis 2	Z	4
15XN1C-E	Thesis 1	Z	4
15XN2C-E	Thesis 2	Z	4
16SHMI-E	Simulation and HMI	Z,ZK	3
Simulation for the systems in transportation and vehicle systems. User interface, HMI (human-machine interaction), virtual reality and computer graphics for ITS. Simulation theory with application of computing equipment. Creating computing models. Mechanic and dynamic systems and their mathematical models. Simulation of vehicle dynamics, on-land carriage in particular. Virtual reality systems.			
16XN1C-E	Thesis 1	Z	4

16XN2C-E	Thesis 2	Z	4
17AMOL-E	Application of Operations Research Methods in Logistics	Z,ZK	3
Exact, heuristic, metaheuristic methods. Static and dynamic shortest path problem. Location analysis, P&R/K&R facilities location. Travelling salesman problem with constraints. Assignment problem and matching algorithms. Decision making in urban transport. Design of urban transport lines. Scheduling in public transport.			
17FCL-E	Future Cities Laboratory	KZ	3
Future cities system architecture (with focus on C-ITS) and reference projects, functional and technology solutions description and principles, wireless telco solutions dedicated for C-ITS systems (ITS-G5, LTE-V, etc.), security architecture, data security and personal data protection, testing of the systems and functional parameters assessment, technical properties evaluaiton, methods of data collection and processing.			
17PJMG-E	Project Management	KZ	2
Basic terms of the project management, project management standards, organizational structures and processess in the project management, life-cycle of the project, risk analysis, projects in transport and transport infrastructure and their specifics, feasibility study and CBA, project evaluation, PPP projects.			
17SCAR-E	Sustainable Cities and Regions	Z,ZK	3
Cities in antiquity and in the middle ages, renaissance ideal of a perfect city, 19. and 20. century cities, modern city planning, sustainability as a concept, historical development of transportation in cities, modern transportation systems, logistics as a concept, supply chain, logistics center, city logistics.			
17SCF-E	Smart Cities Fundamentals	Z,ZK	6
The main smart city components will be described (intelligent transport systems, smart grids, smart buildings, smart lighting, e-governance, etc.) together with their integration methods by using existing international standards to achieve the synergies among different sectors. The quality of life for different city residents is understood as the main criterial function.			
17SU-E	Smart Urbanism	Z,ZK	6
Urban metabolism and ecology, urban morphology and land use, urban society: demography, mobility, social transtition, urban space and places, urban flows, urban modeling, impact of technology innovations on urban transition.			
17TSC-E	Technologies for Smart Cities	Z,ZK	6
Each presented technology will be described through performance parameters like safety, reliability, integrity, continuity, etc. New business models of technologies' implementation and operation will be introduced to provide advanced deployment decision-making. Legal aspects of technologies' assessment (e.g. GDPR) will be presented for selected application areas.			
17XN1C-E	Thesis 1	Z	4
17XN2C-E	Thesis 2	Z	4
18XN1C-E	Thesis 1	Z	4
18XN2C-E	Thesis 2	Z	4
20AIMI-E	Application of ITS in Urban Engineering	Z,ZK	6
The course focuses mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization of the public space, concept of public space solutions, design of systems for traffic and transport telematics management, coordination of transport modes - automobil, pedestrian, MHD, cyclo, modes etc. New approaches to the development of Smart and green approaches Promoting into Public.			
20GINS-E	Geographical, information, localization and navigation systems	Z,ZK	6
The subject is specialized in problems of work with applications of geographic information systems with special attention to the specialization in the field of transport and telecommunication. It introduces students to geographic data management practices and tools, real world modeling, geographic data storage models, data entry and digitization methods, and a number of other GIS related technologies such as problem mapping, webmap, etc.			
20XN1C-E	Thesis 1	Z	4
20XN2C-E	Thesis 2	Z	4
21XN1C-E	Thesis 1	Z	4
21XN2C-E	Thesis 2	Z	4
22XN1C-E	Thesis 1	Z	4
22XN2C-E	Thesis 2	Z	4
500EKL3	Ecology III - Social Ecology	KZ	2
Social Ecology: The subject deals with the relationship of man and the environment in landscape and settlements. It acquaints students with selected methods of socio-ecological research and participation of citizens in the formation of the rural environment, the city and its socio-spatial structure. The theoretical part of the subject is based on concrete practical examples, which are processed by the students and present them during the semester.			
500U3	Urbanism III - Theory	ZK	2
Sustainable development is the governing paradigm of the 21st century. It has long been at the heart of most urban development debates. We are increasingly aware that providing a good quality of life is the right of even the most vulnerable social groups, as the environment directly affects their health. This paradigm shift requires a more holistic approach to urban development. The question remains, how can it be successfully implemented in practice? What kind of urban theories can we use to ensure this development? The subject introduces the student to the most important urban theories of the 20th and 21st centuries. It shows the emergence and transformation of urban development debates, theories and experiments against the background of their social and economic development. Students are guided to develop their critical thinking: to recognise, analyse, evaluate and understand the impact of urban theories on the city through concrete case studies.			
555UP1	Planning 1 - Urban Planning	ZK	3
In the course of Urban Planning I, we teach students on how the cities were planned from ancient times to the present and how discipline itself have evolved in the course of time. By using the real examples, we describe urban planning as a complex process with numerous feedbacks that evolves in time and involves various actors with different values and interests and resources. The course presents general principles and concepts of European spatial planning and planning system in the Czech Republic providing students with practical insight into relevant planning documents, legislation and institutions. Special lectures focus on actual topics: planning of urban ecosystems and participatory planning. At the end of the semester students will be evaluated based on the presentation and discussion of their seminar work via TEAMS or in classroom. In their seminar works students will analyse and critically evaluate selected case of planning process in one of the following domains: Urban mobility, Housing, Public services, Ecosystems, Economic activities, Cultural heritage.			

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