

Faculty of Architecture, Czech Technical University in Prague Themes and Abstracts of Dissertations for Academic Year 2020-21

PROGRAMME ARCHITECTURE AND URBANISM: STUDY FIELDS: ATT / Architecture – Theory and Design, AST / Architecture, Building and Technology, DAPP / History of Architecture and Monument Conservation, UUP / Urban Design and Spatial Planning

Research Themes	Institute	Supervisor	Study Field	Summary	Connection to Ongoing Grant / GAČR, TAČR, NAKI, etc.	Connection to Priority, Cooperation, Future Research
Relationship between transport, urban structure and quality of public space	15119	doc. Ing. arch. Irena Fialová	UUP	The research aims to map, name and understand the relationship between transport, urban structure and quality of public space of the city. Problems of large traffic constructions inside cities. Problems of micromobility development.	Ongoing Cooperation with the Faculty of Transportation Sciences at CTU and IPR Prague (Prague Institute of Planning and Development)	1. Tasks of contemporary urbanism, 2. Relationship between social and urban environment, 6. Public space in relation to its real use. 7. City infrastructure 8. Regeneration and revitalization of living spaces 10. Urban models
New significant and successful European urban design and planning interventions	15119	doc. Ing. arch. Irena Fialová	UUP	The aim of the research is to find new urban interventions that help to significantly revitalize the city. Identifying current best practices for designing and implementing successful urban projects.		1. Tasks of contemporary urbanism, 2. Relationship between social and urban environment, 6. Public space in relation to its real use 8. Regeneration and revitalization of living spaces
Socio-economic aspects of spatial development.	15121	doc. Ing. arch. Jakub Vorel, Ph.D.	UUP	Subject of scientific research activity: analysis and experimental verification of the effectiveness of existing or proposed economic instruments of territorial development in a market economy as a possible complement to standard administrative-regulatory instruments. Focus on spatial and social distribution of costs and benefits and on the internalisation of externalities resulting from land use and land development. Methodological approaches: quantitative analysis (machine learning methods, spatial econometrics) and simulation modeling (ABM) methods. Remarks: possibility of participation in research projects, in particular the project under the TAČR ÉTA call, publication of results and dissertation in English, the applicant should contact the supervisor at least one week before the deadline for submission of the application and agree on details.	TL03000695 - Modely oceňování veřejných statků pro účely prostorového plánování - žádost o projekt podaná v programu TAČR ÉTA; TN01000024 - NÁRODNÍ CENTRUM KOMPETENCE - KYBERNETIKA A UMĚLÁ INTELIGENCE (NCK KUI), hlavní řešitel prof. Ing. Vladimír Mařík, DrSc., aplikační oblast: nástroje Smart Cities pro komplexní posuzování záměrů rozvoje území.	P3: Innovation of tools for land development planning and management
Sustainable urban mobility and accessibility.	15121	doc. Ing. arch. Jakub Vorel, Ph.D.	UUP	Subject of scientific research: exploring the relationship between transport mobility and land-use in urban regions; exploring the effectiveness of administrative-regulatory and economic instruments for achieving sustainable mobility and accessibility in urban regions. Methodological approaches: discrete choice models, simulation modeling (i.e. např. MATSim, SUMO, UrbanSim, GAMA, MANSON, AnyLogic), machine learning methods, use of GIS and Python, JAVA. Remarks: possibility to participate in research projects, in particular with FD and CIIRC, publication of results and dissertation in English, the applicant should contact the supervisor at least one week before the deadline for submission of applications and agree on details.	TN01000024 - NÁRODNÍ CENTRUM KOMPETENCE - KYBERNETIKA A UMĚLÁ INTELIGENCE (NCK KUI), hlavní řešitel prof. Ing. Vladimír Mařík, DrSc., aplikační oblast: nástroje Smart Cities pro komplexní posuzování záměrů rozvoje území.	P6: Sustainable mobility and urban structures
Sustainable development of suburbs.	15121	doc. Ing. arch. Jakub Vorel, Ph.D., Ing. arch. V	UUP	Subject of scientific research: research of current trends and tendencies of suburbanization in the Czech Republic, both in the metropolitan area of Prague, in the hinterland of large cities, as well as in peripheral regions in the Czech Republic. Focus on identifying and systematizing the characteristic problems and deficits of sustainable development of suburban localities, including tools and procedures for their elimination. Investigation and systematization of possible scenarios of future suburban development in the Czech Republic, including identification of key potentials for their sustainable development. Remarks: possibility to participate in research projects, in particular with FD and CIIRC, publication of results and dissertation in English, the applicant should contact the supervisor at least one week before the deadline for submission of applications and agree on details. Remarks: publication of results and dissertation in English, the applicant should contact the supervisor at least one week before the deadline for submission of the application and agree on details.	TB050MMR001 - Standardy dostupnosti veřejné infrastruktury: TA ČR Bela (ukončený výzkum)	P1: Sustainable development: urban regeneration, short-distance city, availability of public infrastructure, economically, environmentally and socially viable land use.
Form Active Structures	15122	doc. Dr. Ing. Marín Pospíšil, Ph.D. školitel specialista Ing. arch. Lukáš Kurilla, Ph.D.	ATT, AST	At the time of Master Builders, a correct choice of architectural form was the most important step in designing mechanically stable structures. New materials, structural elements and computational methods introduced during the Late Modern Period enabled design of large span flat structures in which previously dominative stress tension was replaced by bending moments. This resulted in a retreat from the form finding process in creating load-bearing structures. The topic of the dissertation will be focused on optimization of architectural form of load-bearing structure in a digital design via Form Active Structures.		yes
Historical load-bearing structures, materials and technologies	15122	doc. Dr. Ing. Marín Pospíšil, Ph.D.	AST	Load-bearing structures, materials and technologies in the history of architecture from various points of view. (Eg.: Historical processes in creating load-bearing structures. Materials in historic load-bearing structures. Failures of historic load-bearing structures. Diagnostics of historic load-bearing structures. New materials for renovation of historical load-bearing structures.)	Vazba na grant NAKI DG18P020V033 "Metody pro zajištění udržitelnosti ocelových mostních konstrukcí industriálního kulturního dědictví" a grant NAKI DG16P02M055 "Vývoj a výzkum materiálů, postupů a technologií pro restaurování, konzervaci a zpevnování historických zděných konstrukcí a povrchů a systému preventivní ochrany historických a památkově chráněných objektů ohrožených antropogenními a přírodními riziky"	Connection to the priority of the Institute of load-bearing structures - historical load-bearing structures
Theory of Interactive Architecture	15116	prof. Dr. Ir. Henri Achten, Ph.D.	ATT	Despite many new technological developments, there is no theoretical framework what interactive architecture is. The goal in this project is to establish a comprehensive framework to describe, model, and simulate interactive architecture, starting from Multi-Agent Systems theory.	CELSA/18/020	yes

Use of recycled polyethylen tereftalate in architecture	15116	prof. Dr. ir. Henri Achten škollitel specialista Ing.arch. Kateřina Nováková, Ph.D.	ATT	The research on the reuse and recycling of polyethylen tereftalate in architecture and design has a history of 5 years at th FA CTU Prague. The research is focused on the use on 3D printing technology of the recycled material and design of the structural elememnts with reuse or recycled plastic PET bottles.	TA 830/8301708E000 Karlovar. minerál.vody.	yes
Manifestations of Interactive Architecture	15116	prof. Dr.ir.Henri Achten, Ph.D.	ATT	For understanding what interactive architecture is, it is necessary to build prototypes and test them with people. Prototypes give insight in the complexity of interactive systems, and testing with people gives insight into the psychological and physiological relationship between people and interactive systems.	CELSA/18/020	yes
3D Concrete Printing with Robots	15116	prof. Dr. ir. Henri Achten, Ph.D. škollitel specialista Ing. arch. Kateřina Nováková, Ph.D.	ATT	Robotic 3D Printing has the advantage to highly minimize the amount of concrete because through additive manufacturing concrete is deposited only there where it is needed. Complex shapes can be realized without the need of expensive formwork. The research explores the structural and material limits of highly freeform concrete structures.		yes
Active strategies for sustainable buildings	15116	prof. Dr.ir.Henri Achten, Ph.D.	ATT	In contrast to passive technologies, active strategies (reactive components, interaction, new materials, control structures, and information sharing through smart technologies) have potential to further reduce material use of sustainable buildings. However, the trade-off between active and embodied energy, and in the full Life-Cycle of the building is unknown. The project takes stock of all existing and near future technologies, and aims to provide design tools for the design of sustainable buildings.	CELSA/18/020	yes
Digital Twin BIM model for total design of small buildings	15116	prof. Dr.ir.Henri Achten, Ph.D.	ATT	Small buildings have the potential for total BIM modelling during design, projecting phase, and management for the future owner. Digital Twin is new method to track and compare the BIM model with realised building. Research is about the creation and use of Digital Twin BIM in all life-cycle phases of the building from design to use.		yes
Space and Virtual Reality	15116	doc.Ing.arch.Miloš Florián, Ph.D. škollitel specialista Ing.arch. Lukáš Kurilla, Ph.D.	ATT			yes
Behavioral Analysis of Public Space	15116	doc.Ing.arch.Miloš Florián, Ph.D. škollitel specialista Ing.arch. Lukáš Kurilla, Ph.D.	ATT		TACR: TN0100024/1.12	yes
Form Active Structures	15122	doc. Dr. Ing. Martin Pospíšil, Ph.D. škollitel specialista Ing.arch. Lukáš Kurilla, Ph.D.	ATT, AST	At the time of Master Builders, a correct choice of architectural form was the most important step in designing mechanically stable structures. New materials, structural elements and computational methods introduced during the Late Modern Period enabled design of large span flat structures in which previously dominative stress tension was replaced by bending moments. This resulted in a retreat from the form finding process in creating load-bearing structures. The topic of the dissertation will be focused on optimization of architectural form of load-bearing structure in a digital design via Form Active Structures.		yes
Advanced Acoustic Systems	15116	doc.Ing.arch.Miloš Florián, Ph.D. škollitel specialista Ing.arch. Lukáš Kurilla, Ph.D.	ATT	Architecture was always precieved also aurally. Human tendency towards music is deeply rooted in the origins of language same as human needs of shelter gave rise to numerous architectural ingenuities. Musical piece is not only meeting the architecture in the acoustic space, it is being mixed and intertwined with it. On the other hand urban areas struggle with noise, open-space offices and restaurants fight with speech intelligibility and concert halls combat their reverberation. Exploring the relationships between architecture and music requires both artistic and technical insight and not only knowledge of acoustic phenomena. The development of multimedia technologies (digital recording, audio analysis tools, Fourier transformations, generative modeling) enables previously unthinkable contextualizations and syntheses.		yes

Usti nad Labem Region - its identity yesterday, today and tomorrow.	15127	Ing.arch.Ondřej Beneš, Ph.D.	ATT	North Bohemia today faces many problems that have their roots in the ancient and recent past. The point is to map them, as well as to find adequate ways and moments for improvement. Poor relation to location and location is then one of the moments that deserves the most attention.		
Urban, regional and provincial architects in our country and in Europe.	15127	Ing.arch.Ondřej Beneš, Ph.D.	ATT	Not only Litomyšl, but also many other Czech towns are urban architects. The next step should be the establishment of regional architects and then state architects. What can this institution bring in Europe and what models would be most appropriate in our country?		
City Most	15127	Ing.arch.Ondřej Beneš, Ph.D.	ATT	A unique city that awaits the least unique future. In the middle of the lakes that will arise over the next decades in the surrounding area will be an oasis or a slum? What are its development options?		
54/5000 Landscape and settlements of North Bohemian basin area after mining.	15127	Ing.arch.Ondřej Beneš, Ph.D.	ATT	The entire pelvic area (400 km2) will change radically over the next decades. What will this transformation bring to the landscape and people, and most importantly, what could it bring?		
What is current relationship of theory and practice in Czech, world architectural creation?	15127	Ing.arch.Ondřej Beneš, Ph.D.	ATT	Is architectural theory and criticism always "the other" that follows the performance of creative architects, or can it even match it, or can it even have the aspiration to even show directions?		
Innovative building concepts	15128	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	ATT	With rapidly growing urbanization (54% of the world's population now lives in urban areas and this ratio is expected to grow to 66% by 2050), new building concepts need to be sought – energy-active buildings, use of environmentally friendly materials, constructions with low consumption of resources, reducing the impact of buildings on the creation of a heat island in the city, increasing local biodiversity or building life cycle. The research topic will be specified according to the applicant's focus.	Centre for Advanced Photovoltaics (CAP). CAP sdružuje špičkové odborníky z oboru materiálů a architektury z ČVUT i ze zahraničí. Jedná se o multidisciplinární prostředí ke zformování špičkového výzkumu v oblasti teoretické i aplikované fotovoltaiky.	The first research priority of the Institute - Sustainable Architecture. The thesis is a follow-up to the long-term activities of the Institute in the field of "sustainable architecture", teaching in the subject Atelier, Ecology I and ongoing research.
Adaptive reuse	15128	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	ATT	"Adaptive reuse" refers to the process of reusing existing buildings for a purpose other than that which they were originally built for. It can be an alternative to new construction in terms of sustainability and circular economy. The aim is to explore different approaches that activate the hidden potential of buildings and give them new energy. Research can take the form of theoretical research in combination with research-by-design method. The research topic will be specified according to the applicant's focus.		The first research priority of the Institute - Sustainable Architecture. The thesis is a follow-up to the long-term activities of the Institute in the field of "sustainable architecture", teaching in the subject Atelier, Ecology I and ongoing research.
Designing for extremes	15128	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	ATT	Designing for extreme environments, including emergency shelters, polar stations, orbital and lunar devices. This is a complex problem that requires a multidisciplinary approach. In addition to technical and environmental challenges, the architect must deal with the risk factors related to isolation, imprisonment and deprivation. When designing such objects, he must take into account limits in terms of energy, construction, material transport, construction life cycle, etc. The research topic will be specified according to the applicant's focus.		The first research priority of the Institute - Sustainable Architecture. The thesis is a follow-up to the long-term activities of the Institute in the field of "sustainable architecture", teaching in the subject Atelier, Ecology I and ongoing research.
Urgence of ecological approach to architecture	15128	prof. Ing. arch. Zdeněk Zavřel, dr. h. c.	ATT	The current view of radical climate change exceeds estimates to date. CO2 reduction by using the standards of recognized certification methods (LEED, BREAM, DHGB, etc.) is not enough to achieve the climate targets. Are we able to define new boundaries...? The research topic will be specified according to the applicant's focus.		The first research priority of the Institute - Sustainable Architecture. The thesis is a follow-up to the long-term activities of the Institute in the field of "sustainable architecture", teaching in the subject Atelier, Ecology I and ongoing research.

Affordable housing	15128	doc. Ing. arch. Dalibor Hlaváček, Ph.D., doc. Ing. arch. Hana Seho, prof. Ing. arch. Zdeněk Zavřel, dr. h. c.	ATT	To date, the problem of affordable housing lacks specific research that could underpin the necessary policy decisions. It is necessary to clearly define the boundaries of the concept itself and then to derive both the technical and financial standards applicable to wider practice. The research must include both historical analysis and orientation in the wider European area. The initiative developed by Czech architects in the interwar period in this area has been so distorted by a long period of socialist state construction that continuous research in the current market economy model has completely shifted into the hands of economic and sociological institutions. This is a multidisciplinary topic in which it is necessary to build on research in related disciplines. The research topic will be specified according to the applicant's focus.		The second research priority of the Institute - Architecture and typology. The work is a continuation of the course in the subject Atelier and long-term activity of the Institute members in the European Association for Architectural Education.
Root of quality of Dutch architecture	15128	prof. Ing. arch. Zdeněk Zavřel, dr. h. c.	ATT	Excursion to modern history and contemporary theory. The unprecedented quality of Dutch architecture has historical roots both in the cultural field and in society as a whole. Are we able to trace the critical path and learn from it...? The research topic will be specified according to the applicant's focus.		The second research priority of the Institute - Architecture and typology. The work is a continuation of the course in the subject Atelier and long-term activity of the Institute members in the European Association for Architectural Education.
Architectural discipline and its instruments	15128	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	ATT	The architect's practice has changed dramatically in recent years thanks to digital technologies, advances in materials, construction and technology, and the evolution of construction requirements in the context of sustainable development. Increasing and changing demands on the architect must be reflected in practice and within the framework of architectural education. The subject of research is the profession of architect and the role of architectural schools in relation to this profession. The research topic will be specified according to the applicant's focus.		The third research priority of the Institute - Architectural discipline and its tools. The work is a follow-up to the course "Studio and Design-Build Projects", the long-term activities of the Institute members in the European Association for Architectural Education and concurrent research in connection with new teaching methods (GACR, SGS).
The role of an architect in the integral design of buildings	15128	prof. Ing. arch. Zdeněk Zavřel, dr. h. c.	ATT	The quality of a complex building design cannot be a simple sum of the work of individual professions. Thanks to his holistic approach, architect has traditionally played the role of "director" of complex processes. Will it be so in the future? The research topic will be specified according to the applicant's focus.		The third research priority of the Institute - Architectural discipline and its tools. The work is a follow-up to the course "Studio and Design-Build Projects", the long-term activities of the Institute members in the European Association for Architectural Education and concurrent research in connection with new teaching methods (GACR, SGS).