

Research Themes and Summaries of Dissertations for Academic Year 2023/24

Study programme Architecture and Urbanism in Study Fields:

ATT / Architecture, Theory and Creation

AST / Architecture, Building and Technology

DAPP / History of Architecture and Monument Conservation

UUP / Urban Design and Spatial Planning

KA / Landscape Architecture

Study Field	Form	Department	Supervisor	Research Theme	Summary
DAPP	Full-time	Department of Theory and History of Architecture (15113) / Ústav teorie a dějin architektury (15113)	mgr Hubert Guzik, Ph.D.	Housing in Czechoslovakia	Residential architecture from the 1920s to the 1990s (specific timeframe and scope will be based on applicant's preferences). In addition to the "traditional" history of architecture, it is possible to examine, among other things, changes of lifestyle, interior design, user preferences and of general expert and political discourse on housing in the given period. The advantage would be an interdisciplinary approach that combines methodological tools of both the history of architecture and general history, or sociology.
DAPP	Full-time	Department of Theory and History of Architecture (15113) / Ústav teorie a dějin architektury (15113)	doc. PhDr. Jana Tichá, Ph.D.	Modern architecture within the framework of nature	The relationship of architecture and nature has risen to the forefront of professional debate with the increasing importance of environmental issues. Designing of buildings, urban areas and landscape is ever more understood as a holistic discipline both conditioned by and generating complex relationships within the environment. The research will be focused on specific issues in both history and present of architectural theory and practice, and will be based on theoretical reflection of holistic approach to architecture as environmental design.
ATT	Full-time	The Department of Architectural Modelling – MOLAB (15116) / Ústav modelového projektování - MOLAB (15116)	doc.Ing.arch. Kateřina Sýsová, Ph.D.	The use of additive technology in architecture focused on environmentally sustainable materials. (Mycelium, Mud, Earth, recycled plaster, PLA, biomaterials).	The research is focused on the use of additive technology in architecture focused on environmentally sustainable materials. (Mycelium, Mud, Earth, recycled plaster, PLA, biomaterials). Robots and large extruders are to be used.
ATT	Full-time	The Department of Architectural Modelling – MOLAB (15116) / Ústav modelového projektování - MOLAB (15116)	prof.Dr. Henri Achten	Hybrid Models for Digital Twin in Design Process	Hybrid models combine Digital Twin technology with conventional scale models. They provide the ground for the models to become more physically aligned and thus inform the design process in a more realistic way. This research builds on existing theory developed at the department to apply, test, and evaluate Hybrid Models in the design process.

ATT	Full-time	The Department of Architectural Modelling – MOLAB (15116) / Ústav modelového projektování - MOLAB (15116)	prof.Dr. Henri Achten	Digital Twin Dashboarding for the Design Process	Throughout the design process, architects take their decisions based on knowledge they have developed so far in the project. To enable a fluent process that does not interrupt the flow of the process, complex information needs to be clearly communicated. Part of the information comes from conventional and hybrid models using Digital Twin technology. Dashboarding is a UX approach that provides real-time summaries of ongoing processes. The goal of the research is to combine information streams in the design process in various comprehensive dashboard systems that will be tested during the design process.
ATT	Full-time	The Department of Architectural Modelling – MOLAB (15116) / Ústav modelového projektování - MOLAB (15116)	prof.Dr. Henri Achten	VR Testbed for Interactive Architecture	Interactive architecture is made up of reactive parts that react to the environment and inhabitants. Creating physical mockups is expensive and limits the amount of models that can be tested. Virtual Reality allows relatively cheap modeling of multiple future scenarios, that due to their realism and closeness of daily experience, can offer insights impossible to gain with numerical models and physical simulation. The purpose of this research is to set up the pipeline for VR-based assessment projects that can act as a Testbed for future scenarios of interactive architecture. It should be noted that the research, intermediate results, publications, and final thesis are to be in English language.
ATT	Full-time	The Department of Architectural Modelling – MOLAB (15116) / Ústav modelového projektování - MOLAB (15116)	prof.Dr. Henri Achten	User Experience of Interactive architecture	Elements of interactive architecture that occupy and are active in the same space as the inhabitant create a new spatial experience for the inhabitant. In this research we build full-scale interactive prototypes that are tested against a range of experimental settings (fully virtual, mixed virtual-real, full real). The result will be a descriptive model of the relation between inhabitant and interactive space.

ATT	Full-time or combined	Department of Building Theory (15118) / Ústav nauky o budovách (15118)	prof. Ing. arch. Irena Šestáková	A strategy for adapting one's own home in the presenior phase of life	The number of people with disabilities is increasing in the Czech Republic. The gap between the increasing number of people with mobility limitations and the decreasing number of people caring for them is rapidly opening. This trend is likely to continue as the average/median age of life of citizens in the Czech Republic is increasing. It is therefore necessary to look for new perspectives and possibilities for solving this problem and to transfer some of the burden elsewhere. In this sense, it is not only about increasing the quality of life of a defined segment of the population, but about efforts to preserve the social care system as people imagine and even rely on it. A significant relief can be the emphasis on the so-called strategy of adapting one's own household in the pre-seniors or early seniors phase of life. Effective preparation of the environment at the level of the flat of the regular housing stock can compensate for the expected temporary and permanent deterioration of mobility possibilities and thus the entitlement to care services in the segment of the target group, which shows by far the greatest dynamism of growth.
ATT	Combined	Department of Building Theory (15118) / Ústav nauky o budovách (15118)	MgA. Ondřej Císlar Ph.D.	Multifunctional institutions in the context of the City	The combination of the functions of cultural educational and civic institutions (halls, cinemas, libraries, galleries, community centres, etc.) is a trend in revitalising the urban fabric. The priority is the path to sustainability and efficiency of the institution. They include support for community and educational functions in relation to cultural functions, functional requirements at the scale of the room - multifunctional hall, acoustics, light, technology,, functional requirements at the urban scale, efficiency of operation. The research will be conducted through qualitative and quantitative comparison of selected case studies. The outcome may be a methodology and strategy for the preparation of this type of buildings.
ATT	Full-time or combined	Department of Architectural Design II (15128) / 15128 Ústav navrhování II	prof. Ing. arch. ir. Zdeněk Zavřel, dr. h. c. Školitel specialista: MArch (BI) Ing.arch. Yvette Vašourková, PhD.	Redefining Sustainability - Aesthetics of Complexity	The prerequisite for creating a quality environment is, complexity and diversity, which integrates the respect we have for the place where we enter with our design. Quality is not in visuals or technology but in the integrity of all the factors that come together to form the new, "Gesamtkunstwerk." Evaluation categories are not limited to visual criteria but also relate to topics such as purpose, environment, economics, construction, technology, durability, and ecology; all of which must be balanced to achieve quality. This research will target significant publicly funded projects. It will build on the newly established, New European Bauhaus Initiative, which aims to transcend the boundaries between science and technology, art and culture, and social inclusion, all in all, creating precise and sincere solutions to everyday problems.

ATT	Full-time or combined	Department of Architectural Design II (15128) / 15128 Ústav navrhování II	prof. Ing. arch. ir. Zdeněk Zavřel, dr. h. c.	The role of an architect in the integral design of buildings. Urgence of ecological approach to architecture.	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 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...?
ATT	Full-time or combined	Department of Architectural Design II (15128) / 15128 Ústav navrhování II	prof. Ing. arch. ir. Zdeněk Zavřel, dr. h. c.	Roots of quality of Dutch architecture	The topic of the work will be the observation of two parallel timelines CZ x NL in the period 1945 - 1989 in the architectural practice of both countries. The candidate will follow the consequences in understanding the current theory and its projection into practice in completely different social conditions. The Department of Architectural Design II will mediate close contact with the relevant experts or departments of TU Delft - Afd. Bouwkunde, or other institutions.
ATT	Full-time or combined	Department of Architectural Design II (15128) / 15128 Ústav navrhování II	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	Architecture of motion	Railways are the least polluting means of public transport and are gradually becoming the basis of national transport strategies and part of urban decarbonisation solutions. The topic of the work will be the latest trends in the architecture of railway structures in the European environment. The research topic will be specified according to the focus of the applicant.
ATT	Full-time or combined	Department of Architectural Design II (15128) / 15128 Ústav navrhování II	doc. Ing. arch. Dalibor Hlaváček, Ph.D.	Architecture of sub-saharan Africa	African architecture is exceptionally diverse and has been influenced by foreign cultures for centuries. The traditional architecture is characterized by the use of local materials and passive principles of indoor environment control. The research topic will be the connection of traditional and modern architecture of sub-Saharan Africa with an emphasis on sustainable construction.
KA	Full-time or combined	Department of Landscape Architecture (15120) / Ústav krajinářské architektury (1510)	RNDr. PhDr. Markéta Šantrůčková, Ph.D.	Interpretation of historical cultural landscapes	Study of historical cultural landscape, its values and endangerment as a base for planning and management on the landscape level and landscape adaptation on the climate change. Types of the historical cultural landscapes and their characteristics. Methods of interpretation of the historical cultural landscape.

UUP	Full-time or combined	Department of Spatial Planning (15121) / Ústav prostorového plánování (15121)	doc. Ing. arch. Jakub Vorel, Ph.D.	Socio-economic aspects of spatial development	Subject of scientific research activity: analysis and experimental verification of economic instruments of spatial development as a possible supplement to standard administrative-regulatory instruments. Research will focus on one or more aspects of spatial development: the management of the demand and / or supply side of spatial development, the regulatory and proactive role of the public sector, private-public cooperation and tools regulating the distribution of costs and benefits among actors. Publication of results and dissertation in English, the applicant should contact the supervisor at least one week before the deadline for submission of applications.
UUP	Full-time or combined	Department of Spatial Planning (15121) / Ústav prostorového plánování (15121)	Ing. arch. Veronika Šindlerová, Ph.D.	Sustainable development of suburbs	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: 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 must contact the supervisor at least one week before the deadline for submission of the application and agree on details.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. arch. Marek Pavlas, Ph.D.	Timber architecture - limits and possibilities, the way to sustainability and efficient architecture	Legislative limits of maximum height of timber buildings in Czech Republic are slowly getting less and less strict. Objectives and main points: To show real limits of wooden construction in the Czech Republic and abroad. To point out the importance and benefits of using wood for larger buildings in the areas of: Environment, Speed and efficiency of construction, possibilities of prefabrication, Saving of human resources, Construction accuracy, Link to the use of BIM tools. Documenting hypotheses based on examples of buildings realized abroad. The purpose of the work will be to contribute to a change in thinking about the possibilities and limits of wooden architecture.

AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. arch. Jan Hlavín, Ph.D	Structural detail in building envelopes	Analysis of the material and technical design of contact, sandwich and ventilated envelopes of buildings for housing and services in relation to architectural and structural detail. The thermal and technical regime, fire safety and air permeability of the envelope will be evaluated using a set of examples. The work will also include the behaviour of connecting joints of openings and basic costing in relation to the lifetime of the structure and maintenance requirements. It will conclude with recommendations for the design of material and technical solutions for each type of façade, taking into account the parameters of the internal and external environment.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. arch. Jan Hlavín, Ph.D	The relationship between the architectural and structural design of the building and the energy requirements for its operation. A case study.	Design and evaluation of architectural and building design options for a specific apartment building in a selected location with regard to the energy balance of operation during the year. Influence of individual parameters - building location, shape, glazing, building envelope materials/etc. The achievable effect on the heat loss/gain of the building will be monitored. The theoretical part of the thesis will deal with the methodology of energy performance assessment and recapitulation of experience with the design and implementation of energy efficient buildings - presentation of implemented buildings and comparison of technical solutions and achieved parameters.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. arch. Jan Hlavín, Ph.D	The impact of proper use and maintenance on extending the service life of buildings	Research into the parameters of the building structure and its technical equipment that need to be determined so that improper use of the building does not reduce its service life throughout its life-long cycle.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. Aleš Marek, Ph.D., Ing. arch. Marek Pavlas, Ph.D. (školitel specialista)	Research on multi-functional mid-rise and high-rise timber buildings: determination of BDS of the structure for the life-long cycle of the building.	Research and verification of limits for determining the basic technical parameters of all-wood construction of medium- and high-floor multifamily buildings. Determination of the data standard of the building (DSS) of the building information model at different stages of the integrated design of the building and during its use. Specification of the process and benefits of BIM within the construction life cycle. In collaboration and coordination with 15118 and 15124.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. Aleš Marek, Ph.D.	Benefits of integrative building design for their sustainable construction and operation using the BIM method.	Analysis, evaluation and recommendations for modification of study documents for integrated approach in architectural design of buildings using the BIM method with a focus on sustainable construction, including a comprehensive evaluation of buildings and their economic optimization within their life cycle.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. Aleš Marek, Ph.D.	Coordination methods of architecture / engineering design with building services by BIM method.	Analysis, evaluation and recommendations for modification of study documents for coordination of BIM method using collaborative / multidisciplinary design of buildings with a focus on sustainable way of construction and economic optimization of building costs in the life cycle.

AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. arch. Marek Pavlas, Ph.D., Ing. Luboš Káně, Ph.D. (školitel specialista)	"Forgotten" structural and material systems from natural materials and their potential for a sustainable future	Research and evaluation of "forgotten" structures and materials (e.g. half-timbered masonry, timber plank vaults, stone roofing, unburnt bricks, earth dwellings ...) for their use in sustainable design. The subject of the work is to identify applicable structures and materials, evaluate them, including the establishment of criteria, for application in the present and future, to explore the possibilities of current science and technology for the modern use of structures and materials, to identify the possibilities and risks of use and to propose a way of upgrading the selected structures and technologies. The research will look at both local and international sources.
AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. Aleš Marek, Ph.D., Ing. Luboš Káně, Ph.D. (školitel specialista)	Comparison of construction and material systems according to environmental parameters, including carbon footprint.	Research of structural and material systems of buildings for different functional uses based on selected aspects of environmental assessment. Determination of methodology and values for individual parameters of environmental assessment, determination of criteria and weights of individual parameters for comparison. Carrying out calculations and comparison of individual systems on the basis of these calculations, including the carbon footprint. Comparison and evaluation of the individual systems and determination of the area of appropriate use of the individual systems, including definition of the area of possible development of these systems.
AKT	Full-time or combined		Ing. arch. Marek Pavlas, Ph.D., Ing. Luboš Káně, Ph.D. (školitel specialista)	Verifying the feasibility of mass replacement of traditional building materials with "growing" resources	Research will be carried out for selected crops suitable for the production of construction materials, thermal insulation materials, binders, adhesives, etc. An analysis will be made of the annual traded volumes of conventional materials of the same type. Based on the volume analysis, the amount of land needed to grow a quantity of the identified crops, with sustainable use of the identified land, that would allow the substitution of significant quantities of mass-produced conventional materials will be verified. A criterion for the 'significance' of each conventional material will be defined to determine the volume to be replaced by 'growing' resources.

AKT	Full-time or combined	Department of Building Construction I (15123) / Ústav stavitelství I (15123)	Ing. Aleš Marek, Ph.D., MArch. Ing. arch. Yvette Vašourková (školicel specialista)	Re - Creativity / Do it yourself	Self-build is an increasingly widespread phenomenon in Europe, e.g. in Norway up to 70% of individual buildings are now built by the inhabitants themselves. How can an architect influence this form of construction so that even these small buildings are based on design principles? How could a given available construction method be linked to the reuse of building materials and elements? In our research we can draw on our own experience, when in our environment, especially in the period from the 1970s to the 1980s, recreational and individual buildings were built on their own, often making creative use of leftover and used materials. The research will be aimed at finding principles and solutions using re-used materials in individual buildings and interiors. The research opens up a space for a circular aesthetic of architecture.
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