

Basis of Scientific Work

Students will receive general information about the process of preparation and implementation of a research project and this information applies for the preparation of their own doctoral thesis. Lectures, doctoral students' own work and thematically oriented discussions above them are aimed at helping doctoral students in formulating the subject and methodological preparation of their doctoral studies and then their dissertation.

Topics of lectures:

- General research methodology and scientific work methodology.
- Data → information → knowledge → wisdom
- Research methodology - choice of method, qualitative and quantitative research
- Hard and soft data, principles, ethics
- Formal principles, technique of elaboration of doctoral thesis and communication of research results
- Organization, management and support of research in the Czech Republic and research activities at CTU

Consultation and discussion of developed dissertation syllabi

Philosophy and Sociology

Cultural and civilizational development is discussed in such a way as to reveal changes in the understanding of nature, technology and self-understanding of man himself - individual historical periods prove to be the age of the specifically prevailing paradigm. This creates a precondition for the assessment of things and relationships, cultural and civilizational artifacts in a broader context, crossing the boundaries of one field or specialization. The aim is to provide a foundation for understanding the development of European culture and civilization in the past and in contemporary changes.

Annotation-content focus:

The course covers the cultural-civilizational development in the time frame from ancient Greece to the present. Every topic is associated with probes into problems - emphasis is placed on getting acquainted with new findings and interpretations.

Basic topics:

Ancient Greek society-culture and civilization; the contribution of the Greeks to the foundations of European culture and civilization.

Greek philosophy as the backbone of ancient Greek culture and civilization and its legacy today;

The epoch of Hellenism and imperial Rome. Causes of Rise, Decline and Extinction-The End of Antiquity.

Middle Ages-World of Christian Culture and Civilization.

Christianity in the changes of time;

The beginnings of the modern age - renaissance, reformation, counter-reformation. Conquering new worlds. Demytologization of the state (N. Machiavelli), the birth of modern

science (Galileo, Descartes). The Thirty Years' War - the first pan-European ideologized conflict;

Enlightenment - Self-confidence of reason and modern times project.

Nineteenth century - post-Napoleonic Europe, the transformation of the sociology of society, the age of the rise of nationalisms, industrialization, the conflict of tradition with modernity and its reflection in culture.

Diagnoses of the crisis of the modern age at the end of the 19th and the beginning of the 20th century.

Philosophical and sociological diagnoses of the present. Rethinking modern times - Foucault, Habermas, Jencks, Lyotard,

Marquard, Venturi, Welsch. Modern, postmodern, globalization, protest subcultures, fundamentalist movements.

Informatics in Science and Research

The course is intended for first-year doctoral students.

Objectives: to provide doctoral students with information support for their scientific work and to introduce them to the academic sphere as future authors of scientific publications.

Students will create an overview of relevant and reliable electronic information sources for scientific work, they will learn to search and obtain full texts effectively in them.

They will know the principles of using information and knowledge in their own scientific publications with regards to copyright and citation and publication ethics and get acquainted with the procedure of publishers in publishing scientific results.

They will learn to work with the citation manager, create a personal citation database from which they will be able to generate citations for their scientific publications.

They will gain an overview of social networks for science and tools for sharing professional information.

Outline:

1. Introduction: organization of the subject, Moodle learning environment, search strategies and relevance of search results, approach to electronic information sources at CTU.
2. Electronic information sources at CTU: search, availability of full texts, Summon metasearch engine, e-books.
3. Electronic information sources for evaluation of science and research: evaluation of science, impact factor, Hirsch index, citation database Web of Science, Journal Citation Reports, Scopus.
4. Open Access - other sources of information for science: principles of Open Access in science and research, OA journals and repositories, publishing in OA mode, predatory magazines and conferences, CTU repository, freely accessible teaching materials foreign universities, diploma and dissertation theses.
5. Acquisition of full texts and extension services of libraries: electronic delivery of documents at CTU, extension library catalog services.
6. Technical standards and patents: technical standardization, standardization institutions, online catalogs of standards, protection industrial property, types of legal protection, patent database.
7. How to publish in a scientific journal: principles of publishing scientific results, structure and requisites of a scientific article, course and rules of review procedure, publishing ethics.

8. How to cite: copyright ethics and plagiarism, copyright law and Creative Commons License, guide how to write university final theses at CTU, citation styles, citation methods, citation generators.

9. Citation managers: tools for creating and managing personal citation databases, selected services, citation managers, transfer, storing and organizing citations, automated citation in the text and generation of citations, comparison of citation managers.

10. Information sharing: social networks for science and tools for sharing professional information.

The Moodle learning environment is used to display study materials, assign and submit assignments, and take tests.

Professional Language

We teach LSP - Language for Specific Purposes (in the case of English ESP)

Improving lexical knowledge and stylistic skills for professional style in the preparation of conference papers, training oral presentation skills.

Key topics:

- Doctoral studies at university
- Writing a professional CV and cover letter
- Filling in forms
- Training of presentation skills, preparation of a conference paper
- Resume writing, summary, annotation
- Description of the project design
- Acquisition and practical use of citation conventions
- Basics of information technology
- Official and work correspondence
- Telephone work contact
- Numerals and numbers - relevant lexicon
- Types of graphs
- Expression of cause and effect
- Comparison of phenomena (expression of pros and cons)
- Expressing differences
- Expressing succession
- Expressing rising and falling trends
- Overview of verbs useful for professional style
- Use of idioms with verbs MAKE and DO in professional language

Theory of Architecture

The aim of the course is to deepen the knowledge of the theory of architecture and to develop the ability of independent critical thinking.

At the same time to show the broader cultural context of architectural discourse. A systematic approach to the issue with emphasis on the current theoretical reflection of architecture will be preferred. The starting point will be theories of modern architecture (modernity, functionalism). Then attention will be paid to structuralism, the Venetian school, semiotics, phenomenology, deconstructivism to current approaches reflecting the shift given by new technological ones possibilities both in architecture and in society. Architecture (modernism, functionalism), attention will be paid to structuralism, the Venetian school, semiotics, phenomenology, deconstructivism to current approaches reflecting the shift given by new technological possibilities both in architecture and in society.

Topics in Contemporary Architecture

The course is focused on discussing key topics of contemporary architectural creation in its wide range from building design through urban planning and spatial planning to monument care. It maps current trends in the production and reception of architecture, interdisciplinary overlaps, sources of inspiration, limits and catalysts of creation. Theoretical reflection of contemporary architectural production has an important place in the seminar program. The specific topics of individual seminars are formulated taking into account the focus and assignment of the dissertation of enrolled doctoral students. Students are expected to actively participate in the debate in the form of thematic presentations during the semester and the elaboration of a final written seminar

Work

Theories of Spatial Planning

Information on the theoretical background and concepts of urbanism - spatial planning, their reflection in the systems and methods of urban and regional planning in some countries and in the relationship between urbanism - spatial planning and public administration. Theoretical currents and schools in spatial planning. Sources of thought of the discipline: utopia and social reform.

The Origin and development of complex planning and regional planning. Schools and theories of political analysis, transactive planning, radical planning, critical theory of progressive planning. Neoconservatism, liberalism, postmodernism and the new legitimacy of planning. Current fragmentation of urban planning concepts and its practical manifestations. Identity, contextualism, lay planning, leverage, public-private cooperation.

Content of lectures / discussions on theoretical literature

- Overview of the directions of planning theories
- Rational theory of the first half of the 20th century - Howard, Geddes, Wright, Faludi
- Endurance in the area - Chicago school, lessons from ecology
- Theory of the good city - Stein, Mumford, Lynch, Whyte
- Critique of expert planning - Arnstein, Jacobs, Alexander
- Planning as a social and political process - incrementalism, advocacy planning, communicative planning
- Neoliberalism
- Postmodernism, feminism - Sandercock
- Space of Flows - Castells
- Digital urbanism?

Topics of current planning - sustainable development, competitiveness, resilience and flexibility - Fischer, Newman, Beatley

Statistical Methods

The aim of the course is to provide doctoral students with the basic knowledge and skills necessary for the processing of quantitative analyzes in research. The course acquaints students with the basic methods of statistical survey and statistical analysis in the form of practical application of individual statistical methods on pre-prepared data sets. Simultaneously with the application of statistical methods, students get acquainted with the basics of the R language - a generally extended platform for statistical analysis.

- Introduction: Installation of the R system, basic R commands. What are statistics for? basic concepts, activities; statistical detection; data types;
- Descriptive statistics: Data display: histogram, quantiles, candlestick chart. Description of data parameters: central measures tendency, scatter, sharpness and skewness;
- Random variable: different types of distribution of a random variable, probability, Central limit theorem

- Introduction to statistical reasoning: Working with sample data, data standardization, z-test, t-test, point and interval estimates
- Hypothesis testing: Population and sample parameters testing, parametric and nonparametric tests with one selection or two selections: z-test, t-test, proportional test, wilcoxon test, dependent, independent selection
- Correlation: Two-dimensional data, display of two-dimensional data, correlation: definition and application
- Analysis of categorical data: Contingency tables, chi-square test of good agreement
- Regression analysis: Basic principles, linear regression, multiple linear regression
- Analysis of variance 1: Basic principles, ANOVA
- Analysis of variance 2: Application of ANOVA
- Repetition and summary

Information Technology and Development Modelling

The course acquaints students with advanced tools for spatial analysis of phenomena in the territory and with computer models designed for experimental research of settlement systems and tools supporting spatial development planning. Based on the focus of their dissertation, students choose one of the following topics:

- Advanced spatial data processing: ArcGIS, QGIS, PostgreSQL, PYTHON software, use of public administration data, use of open data and social network data
- Advanced spatial data analysis: ArcGIS, QGIS, PYTHON software, spatiotemporal data cubes, data GTFS, 3D GIS data
- Urban and landscape spatial metrics and space syntax: FRAGSTATS, QGIS software, depthmapX
- Spatial statistics: ArcGIS software, QGIS, GeoDaSpace
- Microsimulation of urban processes: Anaconda software, UrbanSim
- Modeling of complex phenomena in the territory: agent models NetLogo and Repast Students get acquainted with the selected topic by self-study of recommended literature and in collaboration with the teacher by apply tools for pre-prepared tasks or for the issue of their dissertation.

Teaching procedure:

- Introduction to individual topics, choice of topic, transfer of study materials, software installation
- Consultation of study materials and software and prepared tasks
- Assignment of the application of the tool with regard to the focus of the doctoral student's studies
- Consultation of data and methodology of tool application
- Consultation of preliminary results
- Finalization of outputs
- Presentation of tool application results

Urban and Regional Economics and Management

Land management, strategy and policy of territorial development of cities in various local economic and political conditions. The role of the public and private sector in these conditions. Application of public interest (city, state)

Methods of evaluating financial feasibility, economic and social analysis of territorial development projects. Practical application on a specific case of a feasibility study - assessment of costs and benefits of a development project

Ecology

The aim is to provide students with basic theoretical and practical background of ecological disciplines at the landscape scale.

After graduation, the student - architect is able to evaluate the landscape from various ecological and landscape-ecological perspectives.

Methods of direct landscape assessment and applied methods (classification, typology, etc.) are presented. The landscape is presented here as a framework in which the architect designs his works, but also as the very subject of his interest. The course also introduces the basic tools of ecological planning in the landscape and places them in the context of architecture and spatial planning.

Thematic lectures focused on creating sustainable development strategies as a participatory process, urban ecosystems, "Green building".

Urban Design

1. ENVIRONMENT of the city, basic functions, attributes and development, city - landscape
2. PLACE as a determining factor, morphology, topography, definition, size
3. ORGANIZATION of the city, composition, growth, centers, borders, models
4. BREAKDOWN of the city, parts of the city, hierarchy, relations, facilities
5. CONSTRUCTION of the city, building blocks, typology, public space, matter - space - events
6. INFRASTRUCTURE, fundamental principles and phenomena providing energy to urban tissues
7. TOOLS AND METHODS of urban research and creation, key theories, urban relations
8. REGENERATION of the environment, changes and stability, maturation and recovery, sustainability
9. CURRENT TOPICS, sustainability, vitality, mobility, housing, new systems, changes

Selected Topics in Theory of Heritage Preservation

The basic axis of the course consists of lectures on the theory of monument care. They focus mainly on issues of values and evaluation of cultural (especially architectural) heritage, the role of individual and collective memory in the recognition of monumental value, living and institutionalized memory, the process of social recognition of values and factors that affect it. Considerable attention is paid to the specifics of living intricately layered monumental structures (location, landscape). The concept of an introduction to the extensive theoretical background of the field of monument care is always modified with regards to the composition of study plans of a particular group of doctoral students. According to the individual study plans of individual doctoral students, insight into the theory of the field is complemented by the possibility of individual consultations with specialists focused on historical structures, vernacular architecture, building historical research and the practice of conservation of architectural monuments.

History of Architecture

Preparation for scientific work in the field of history of architecture, balancing the level of knowledge and methodological preparation of doctoral students with various initial training. The approach to doctoral students is individual, depending upon the nature of their initial training and the focus of the doctoral thesis. Lectures are focused on more general phenomena in the history of architecture with particular emphasis on their theoretical and methodological dimension. The aim is to unify the level of knowledge and methodology approach for doctoral students with various previous professional education, orientation in current problems and possibilities research and documentation work; independent work on selected topics.

Aim and method of scientific work in the field.

Methods of art history - historical view.

The place and tasks of the study of the history of architecture in the contemporary history of art.

Architecture - a work of art and a manifestation of material culture.

Construction work and its historical - urban context.

Utility function of a construction work, functional type, its maturation and transformations.

Historic urban structure.

Architect builder, builder.

Special emphasis is placed on current topics, especially in the field of modern and early modern architecture

Semiotics of Architecture

The course is devoted to the basic concepts of semiotics of art and architecture. It is based on the aesthetic theory of Jan Mukařovský, the work of the Prague Linguistic Circle and the Tartu Semiotic School, especially that of Yuri Lotman.

Architecture is understood as the language of sui genesis, while its syntactic, semantic and pragmatic relations are studied.

Attention is paid to examples of architecture emphasizing communicativeness and the importance of the so-called minus-procedures in periods which rather deny this dimension of architecture. The aim of the course is to deepen students' theoretical knowledge and expand their ability to interpret architectural work.

Surveys of Historical Structures

The course develops the doctoral student's ability to independently analyze especially complex layered historic buildings and building complexes in the whole typological range of architectural heritage and in various stages of transformation, to exploit their narrative potential, adequately document it and critically evaluate the findings so that they can serve as a starting material for further research. . Knowledge of architectural-historical research, its interdisciplinary character, the idea of cooperation with other specialized disciplines and the ability of its practical implementation in these contexts belongs to the basic methodological equipment of the researcher in the field of history of building culture. The practical part of the course deepens knowledge and skills in the specific focus of research activities, which the doctoral student uses in his research. The findings from the survey of individual buildings can be adequately applied in the survey and research of historic settlements and cultural landscapes as well as in the practice of care for cultural heritage, its conceptual management and planning.

Building Structures, Materials and Technologies

The course will be taught according to the individual study plan (ISP) of the doctoral student in selected thematic areas:

- Building structures - scientific-research preparation of a doctoral student in the field of analysis of building structures based on a holistic approach to the behavior of the structure. Design and optimization of the structure as a whole. Design and optimization of construction detail. The life cycle of a structure from its pre-project and project preparation to its use and disposal, with respect for a sustainable and gentle way of building. Construction and architecture.
- Building materials - scientific-research preparation of a doctoral student in the field of analysis of building materials. Historical and modern materials. Homogeneous, heterogeneous and composite materials. Life cycle of building materials from preparation through production, their use to ecological disposal. Rheology and aging of materials. Materials and architecture.
- Technical and technological equipment of buildings - scientific-research preparation of a doctoral student in the field of analysis of historical and existing technologies and the search

for new technologies with respect to sustainable and environmentally friendly construction. Technical and technological equipment of buildings and territories. Construction technology. Technology a architecture.

Theory and Technology of Buildings Internal Environment

The course deals with the relationship between architecture, construction, external, internal environment, building physics and their mutual interaction not only in terms of current requirements for the architectural design of the building, but also in terms of historical development.

The new building and the selected reconstruction respond to the current valid regulations and standards from the initial design. Subsequent evaluation of buildings is then positively evaluated in the given evidence in zoning decisions and construction proceedings, when there is no need to intervene in the architectural design. The whole work is integrated from the initial design and thus becomes a compact project.

BIM and Integrated Building Design

The intensive development of existing building structures, materials and technologies, as well as the discovery of new ones, brings a wide range of possibilities to currently use and combine them in the architectural design of buildings.

The way of correct use of individual parts of the building within the whole so that the advantages of individual parts of the building amplify and mutually positively cooperate, including the architectural tone, requires a comprehensive view of the architect on the design of the building.

The rapid development of digitization in building design and especially the use of the BIM method brings opportunities to successfully apply the method of integrated building design not only in all phases of building design, but also in its implementation and operation, which means that the building information model can be used throughout the life cycle. .

Furthermore, social and legislative emphasis is currently placed on the careful design of buildings both during their implementation and operation and disposal.

The success of the whole process depends not only on the quality of the information model of the BIM construction, but also on the way it is shared and by all participants in the lifecycle of the construction in a shared data environment.

The focus of the course is assumed in the following basic areas:

- BIM - building information model and ways of its sharing of Integrated building design
- Its construction principles and multicriteria evaluation of Smart (control) system of buildings
- The use of their data in the optimal setting of building operation
- Modern building structures and materials and their optimization
- Lifecycle of construction and basics of its evaluation
- Sustainable construction of buildings, economic, social and environmental criteria,
- Comprehensive evaluation of buildings
- Analysis of realized buildings using the principles of integrated design

Architecture and Load-bearing Structures

The course in its knowledge part focuses on an overview of the used load - bearing structures and structural technologies in individual periods of cultural development of human society to the current modern constructions and technologies. The overview is supplemented by the profile development of various types of load-bearing structures and the materials used for load-bearing structures.

In the analytical part, the course introduces the methodology and methods of technical research in the field of load-bearing structures. It presents these procedures mainly on current research, which is carried out at the FA in cooperation with other parts of CTU.

In the synthetic part, doctoral students are given a topic such as the elaboration of a proposal for scientific and technical research of a given structure, or another suitable topic from the field of load-bearing structures leading to the field of the doctoral student's dissertation.

Engineering Informatics

The subject of Engineering Informatics provides a general introduction to the concept of information technology with special regard to its use in architecture. The course illuminates the following basic concepts and their content: Geometric modeling, diagrams, sketching - modeling, parametric modeling, data modeling, real-time rendering, virtual reality and augmented reality, physical simulation, simulation of human behavior in the object (in the space) design, simulation and creation of object design with the possibility of processing for production, collaborative design - designing as collaboration more designers on one design, coding knowledge, semi-automated design, generative design and evolutionary design. The course will demonstrate UML, virtual reality and Bayesian networks. Students will choose the basic concept that is most suitable for their doctoral thesis and describe how to use it.

Landscape Infrastructure

The course is focused on important current topics of the landscape. Study of relations between settlements and landscapes of various scales, issues of sustainable development of landscapes and settlements, adaptation of landscape and settlements to climate change. The essence of the course is the study of essential infrastructures of the landscape and their mutual relations (territorial system of ecological stability, green and blue infrastructure), the study of natural infrastructures in relation to technical infrastructures, infrastructures of public spaces in relation to landscape infrastructures. Schools and theories of landscape planning, such as Environmental Urbanism, Landscape Urbanism.

Landscapes in Process – Trends and Trajectories

The course is focused on important current topics of landscape creation in settlements and the principles of their creation taking into account the changing value system of each new generation. The landscape space is understood here as the intersection of the concept of residential spaces and the system of residential greenery as part of the city and landscape, including the principle of blue-green infrastructure with a response to current problems of creating settlements of all scales. Creation of landscape space in the location as essential space for the life of its inhabitants, the satisfaction of all social, environmental, recreational, aesthetic needs in the sense of respecting the identity of a particular place is the basis of the principle of creating a landscape at the scale of the seat and the landscape. The solution of the landscape of settlements in relation to the surrounding landscape, systems of settlement greenery is important for settlements of all levels - cities, but also rural settlements. Part of the task will be to identify strategies that have the potential to immunize the landscape against the exploitative tendencies of consumer society