



## DOCTORAL PROGRAM CLIMATE – CULTURE – BUILDING





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In all inhabited or inhabitable regions on earth buildings are designed and equipped in a way to accommodate people and give them shelter from weather inconveniences and to create indoor thermal comfort for users. To fulfil this most important task of climate-adapted construction buildings were constructed by means and materials available in the respective time throughout all historical eras of mankind. “To have a roof over one’s head” has become an aphorism nowadays but was the primary concern of climate-adapted construction and of human culture and civilisation. The technical means and the architectural style, which was always the expression of the particular building culture, changed in the course of time.

There are considerable differences in worldwide climate. In addition, all constructional activities – as well as any activities of civilisation – entail climate change and thus have an impact on the environment. High-rise buildings, if concentrated in urban centres, change the natural climate and create the so-called “urban climate”. In contrast to natural green spaces the built environment can have a severe impact on the heat and material balance, particularly by the fact that the built environment disturbs the moisture balance. Climate-adapted construction must comply with a great variety of requirements of the respective global climatic zones, since it must be adapted to the climate in a particular location. Global climatic zones can be roughly divided into four categories:

- Cold or extremely cold regions in the north or south towards the Arctic or Antarctic.
- The moderate belt over parts of North America, Europe to the Far East between the 35<sup>th</sup> and 50<sup>th</sup> northern latitude or in the south of southern latitude over the southern part of South America and Africa to the southern part of Australia.
- The hot and dry region over parts of Central and South America, Central Africa, the Orient, India and Australia.
- The hot and wet regions of South America, Africa, China and Polynesia.

In the design and construction of buildings architects and civil engineers must observe the principles of climate-adapted and sustainable construction.

## STRUCTURE OF DISSERTATION

They must use environmentally compatible and ecologically friendly building materials and methods, and they must take care that natural processes are not or only to a very limited degree changed by their constructional concepts.

Climate-adapted construction must cope with a variety of influencing parameters. It must create a comfortable environment inside the buildings as well as in urban centres by applying constructional measures – under economic and ecological boundary conditions – where people feel comfortable. Shelter from weather inconveniences, however, must not be of significant importance in this context but the active management of climatic parameters

### **1<sup>ST</sup> PART**

#### **HISTORICAL BUILDING CULTURE (SURVEY AND EVALUATION)**

- Understanding the reasons and functioning of the locally existing historical architectural style
- Analysis of materials and building constructions
- Measuring and modelling of hygrothermal processes of roof and wall structures
- Energetic and room climatic modelling and evaluation

### **2<sup>ND</sup> PART**

#### **RENOVATION AND OPTIMIZED NEW BUILDINGS (APPLICATION AND DEMONSTRATION)**

- Structural material and material preserving renovation for damage-free conservation
- Preventive conservation and demonstration
- Concept development for locally characteristic new buildings under the aspect of sustainability
- Demonstration projects in the individual target regions

## WISSENSCHAFTLICHE LEITUNG



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