

<b>DEPARTMENT OF BUILDING STRUCTURES</b>
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## II. EQUIPMENT

### II.1 Teaching and Research Laboratories

- Large climatic chamber for synergistic research on heat transfer, vapour diffusion and air infiltration
- Acoustic chamber for experimental research on airborne sound and impact sound insulation
- Large pressure chamber for air infiltration research
- Rain chamber for research on water penetration through details of walls and roofs
- Solar chamber for the study of the energy balance of windows
- Physics laboratory for foundation engineering

## II.2 Special Measuring Instruments and Computers

- Testing equipment for research on the durability of materials
- PC - laboratory for CAD systems
- SUN Microsystem – UNIX laboratory for computer-aided building simulation

## II.3 Computer Software

The following state-of-the-art computer software is used in Computer Building Simulation classes:

- ASAP - a professional optical modelling program designed to calculate the performance of fully three-dimensional optical systems. The program originates from the Breault Research Organization, Inc. (<http://www.breault.com/>);
- ESP-r - a European thermal simulation reference program capable of integrated energy and environmental simulation of buildings. The program originates from the Energy Systems Research Unit of the University of Glasgow (<http://www.strath.ac.uk/Departments/ESRU/>);
- RADIANCE - lighting simulation and rendering system which originates from the Lawrence Berkeley Laboratory (<http://radsite.lbl.gov/radiance/>).

## III. TEACHING

The Department covers the basic study areas necessary for a graduate of this discipline. The theory of building construction is based on a symbiosis of architecture, construction, and applied building physics. In the subjects of building construction, studio design typology, architectural design, thermodynamics, acoustics, daylighting, and the energy efficiency of buildings, students are directed towards the design of construction units, elements, and details by theoretical and experimental methods of reasoning.

### III.1 Graduate Study

Subjects	Semester	Hours Per Week		Lecturer
		Lectures	Seminars	
Technical Drawing	1	0	2	Gieciová
Building Construction I.	2	2	2	Adamská, Šebestová
Building Construction II.	3	2	2	Hykš, Gieciová
Building Construction III.	4	2	2	Zajac, Oláh,
Building Construction IV.	5	2	2	Ohrablo
Building Construction V.	6	2	2	Puškář, Polák
Thermal Engineering of Buildings I.	4	2	2	Bežko, Chmúrny
Design Studio I.	4	0	3	Rabenseifer, ARC
Design Studio II.	5	0	2	Miklósiová, ARC
Design Studio III.	6	0	3	Miklósiová
Building Acoustics and Illumination I.	5	2	2	Puškář, Tomašovič
Building Construction VI.	7	2	2	Szomolányiová
Design Studio VII.	10	0	5	Držka
Energy Effectiveness of	8	2	2	Bielek

Buildings			
Computer Graphics	9	1 – 3	Jamnický, Štujber
Industrial and Engineering Construction	9	0 – 4	Turček
Renewal and Modernization of Buildings	10	2 – 2	Turček, Puškár
Fire Safety of Buildings	7	1 – 2	Mikolai
Design Studio IV.	7	0 – 5	Šebestová
Design Studio V.	8	0 – 5	Šebestová
Design Studio VI.	9	0 – 5	Šebestová
Design Studio VII.	10	0 – 5	Adamská
Computer-Aided Design	8	2-3	Jamnický
Internships	8		Držka
Special Architectural Design	9	2 – 2	Hraška
Building Defects and Reconstructions	9	2 – 2	Greško
Special Seminar I.	9	0 – 2	Szomolányiová
Special Seminar II.	10	0 – 2	Adamská
Building and Energy Urban Acoustics	10	2 – 1	Puškáš
Solar Energy Gains and Illumination of Buildings	10	2 – 1	Puškáš
Design of Architectural Structures	10	2 – 1	Antalová
Thermal Engineering of Buildings II.	9	2 – 1	Beťko, Chmúrny
Aerodynamics and Hydrodynamics	9	2 – 1	Bielek
Low-Energy Architecture	10	2 – 1	Hraška
Design of Architectural Structures	10	2 – 1	Antalová
Computer Building Simulation	9	1 – 2	Hraška, Janák
Urban and Building Acoustics	10	2 – 1	Puškáš
Fire Safety of Buildings	10	2 – 1	Mikolai, Olbřímek

### III.2 Postgraduate Study

Subjects	Semester	Hours Per Semester	Lecturer
Alternative and Renewable Energy Sources	1	2	Bielek
Slovak Energy-Saving Programs	1	2	Chmúrny
Construction Energy Standards and Codes	1	4	Chmúrny
Terminology of the Energy Effectiveness of Buildings (English Translation)	1	texts only	Janák, Rabenseifer
Written Assignment Topics	1	1	Antalová

Theory of Low-Energy Housing	2	2	Bielek
Basements and Foundation Details from the Point of View of Energy Savings	2	2	Turček
Non-Transparent Building Envelope	2	2	Puškár
Transparent Building Envelope	2	2	Puškár
The Role of Flat Roofs in Building Energy Consumption	2	2	Oláh
Energy-Efficient Pitched Roofs	2	2	Szomolányiová
The Effect of Brickwork Moisture upon Increases in Heat Transmission Losses	2	2	Adamská
Heat Regeneration in Energy-Efficient Buildings	2	0,5	Hraška
Energy Features of Solar Radiation and Determining the Irradiation of Buildings by Sunshine	2	1	Puškáš
Architectural Design of Houses from the Point of View of Energy Savings	2	2	Hykš
Durability of Materials and Construction from the Point of View of Energy Savings	2	1	Ohrablo

#### IV. RESEARCH TARGETS

The Department of Building Structures (DBS) at the Faculty of Civil Engineering of the Slovak University of Technology is one of the leading Slovak facilities devoted to building research and development. It assists in the research of the Faculty of Civil Engineering, students, the building industry, the regulatory community and others interested in building and construction practice.

The mission statement of the DBS says: *“Identify, develop, and deploy sustainable and energy-efficient building system technologies by forming partnerships between university sources and industry for analysis, well-characterized experiments, technological development, and market outreach“.*

The scientific and research activity of the Department is aimed at the problems of thermal comfort, heat and humidity transfer through the walls and roofs of buildings and their joints, sound transmission in buildings, room and urban acoustics, the theory of daylighting and the solar energy of buildings, air infiltration and the effect of driven rain on walls and roofs of buildings and their joints, the total energy effectiveness of buildings, the durability of building materials, diagnoses, and building reconstruction.

**Main research areas covered by the Department of Building Structures at the present time:**

1. Climate Model - Slovak Test Reference Year for use in a dynamic simulation program for predicting building energy consumption
2. Precise new methods and models for natural ventilation analysis
3. Development of a dynamic simulation method for mathematical modelling of thermal building performance
4. Physical quantification of passive solar systems as components of solar architecture in a theory for developing low-energy houses
5. Design of a structural system with future parameters (year 2010):
  - optimisation of static criteria
  - optimisation of technology
  - application of energy-efficient construction elements
  - development of joint function systems with the inclusion of a high degree of know-how and technical facilities
6. Research on degrading factors which affect the durability and reliability of selected residential and commercial building structures
7. Research on the properties of structural materials
8. Development and research in system engineering
9. Analysis of comfort parameters - criteria for thermal engineering, energy balance and technical equipment of buildings
10. Analysis of the creation of acoustical criteria in the noise protection of buildings
11. Analysis of the creation of criteria for daylight design systems and artificial lighting in building interiors

**V. RESEARCH PROJECTS**

- VEGA 1/7119/20 – Theory, testing and structural design of transparent facades in the envelopes of both new and modernized ecological and low-energy buildings
- VEGA 1/7120/20 – Integrated simulation of energies and the indoor environment in buildings in the Slovak climate
- VEGA 1/7138/20 – Transparent structures, energy savings and quality of the indoor environment
- KEGA 1/8/99 – Energy efficient buildings and their ecological properties
- SLOV/BRIT 4 – Scientific cooperation in the implementation of EU Standards into relevant National Standards between UMIST Manchester and the Department of Building Structures at the Slovak University of Technology Bratislava funded by the British - Slovak Joint Research Programme between the British Council and the Slovak University of Technology
- MVTS 1 / 7138 / 20 – Collaboration of Austrian, Hungarian, German and Slovak institutions of higher education in the Redevelopment of Rural Areas

**VI. COOPERATION****VI.1 Cooperation in Slovakia**

1. Ministry of Building and Regional Development of the Slovak Republic, Bratislava
2. Ministry of the Environment of the Slovak Republic, Bratislava

3. Slovak Institute of Technical Standardization, Bratislava
4. TASUS, Bratislava
5. TU Košice
6. TU Zvolen
7. University of Agriculture, Nitra
8. VVUPS NOVA, Bratislava
9. Lignotesting, Bratislava
10. Nováky Chemical Works, Nováky
11. Alufinal, Žiar nad Hronom
12. Priemstav, Bratislava
13. Nitrasklo, Nitra
14. Drevina Turany, Turany
15. Matador, Púchov

## **VI.2 International Cooperation**

ČVUT Prague, Czech Republic  
VUT Brno, Czech Republic  
TU Budapest, Hungary  
TU Győr, Hungary  
TU Vienna, Austria  
KEB Berlin, Germany  
TU Stuttgart, Germany  
UMIST Manchester, United Kingdom  
University of Strathclyde, United Kingdom  
Eindhoven University of Technology, The Netherlands  
KU Leuven, Belgium  
MISI Moscow, Russia  
TU Kharcow, Ukraine  
CE Haifa, Israel  
Wolfen WIRN, Austria

### **VI.2.1 Visitors to the Department**

- Ing. M. Kalousek, Faculty of Civil Engineering VUT Brno, Czech Republic, 1 day
- Assoc. Prof. Dipl.-Ing. G. Konieczny, Konieczny Architekten, Stuttgart, Germany, 1 day
- Univ. Prof. Dr.-techn. E. Panzhauser, Vienna University of Technology, Austria, 3 days
- Doc. Ing. J. Sedlák, PhD, Faculty of Civil Engineering VUT Brno, Czech Republic, 1 day

### **VI.2.2 Visits of Staff Members and Postgraduate Students to Foreign Institutions**

Ing. M. Bartko, study stay at the Tokyo Institute of Technology, Japan, 2 years  
Ing. M. Janák, PhD, visit to IFT Rosenheim, Germany, 2 days  
Prof. Ing. J. Oláh, PhD, visit to NRCA Chicago, USA, 1 week  
Prof. Ing. J. Oláh, PhD, study visit to UMIST Manchester, UK, 5 days  
Ing. J. Olbřímek, PhD, visit to TU-VŠB Ostrava, Czech Republic, 3 days  
Dr.-techn. Ing. arch. R. Rabenseifer, study visit to UMIST Manchester, UK, 5 days

## VII. THESES

### VII.1 Graduate Theses

Every year, approximately 60 - 80 students are engaged in fulfilling the requirements of their dissertations. The supervisors of the diploma projects are the professors, associate professors and assistant professors of the Department.

The diploma theses cover:

- General project documentation for residential, public, cultural, sports, industrial and agricultural buildings and facilities
- Reconstruction of buildings
- Theoretical analysis and design of the envelope and interior construction of buildings

## VIII. OTHER ACTIVITIES

### VIII.1 Special Lectures

IT-based environmental simulation courses started under the EU – TEMPUS scheme as part of the Joint European Project 09909-95:

The project is aimed at developing and introducing building performance simulation courses that are integrated and highly interdisciplinary in their content and fully compatible with, and equivalent to, courses at EU universities. Furthermore, newly-developed courses have also been adopted at EU partner universities. The courses have been given at all the participating institutions since the summer term, 1997.

### VIII.2 Commercial Activities for Firms and Institutions

Thanks to its computer and laboratory equipment, the Department of Building Structures meets the highest quality standards for the tasks it performs, particularly in the area of the precise measurement and computer simulation of buildings. Among its most important clients are:

1. The Ministry of Building and Public Works of the Slovak Republic, Bratislava
2. The Ministry of the Environment of the Slovak Republic, Bratislava
3. The Slovak Institute of Technical Standardization, Bratislava
4. TASUS, Bratislava
5. VVUPS NOVA, Bratislava
6. Lignotesting, Bratislava
7. Chemical Works of Nováky, Nováky
8. Alufinal, Žiar nad Hronom
9. Priemstav, Bratislava
10. HUECK-Slovakia, Bratislava
11. Glaverbel Czech, Kryry, Czech Republic
12. Nitrasklo, Nitra
13. Drevina Turany, Turany
14. Matador, Púchov
15. Jančina Architecture Office, Bratislava
16. Závodný Architecture Office, Bratislava



## IX. PUBLICATIONS

### IX.1 Journals

- [1] ADAMSKÁ, G.: New Elements in Damp-Proofing of a Foundation Structure I. In: STAVBA, 2002, No. 11, pp. 39–41 (in Slovak)
- [2] ADAMSKÁ, G.: New Elements in Damp-Proofing of a Foundation Structure II. In: STAVBA, 2002, No. 12 (in Slovak)
- [3] BEŤKO, B.: Sloping Roofs of Family Houses – Building-Physical Problems. In: STŘECHY – fasády, izolace, 2002, No. 2, pp. 18–19 (in Slovak)
- [4] BEŤKO, B.: Thermal Protection of Buildings from the Point of View of Revised Standard STN 73 0540. In: STŘECHY – fasády, izolace, 2002, No. 10, pp. 40-42 (in Slovak)
- [5] BEŤKO, B. – MENDĀN, R.: Heating Energy Consumption of Uninsulated and Insulated Family Houses. In: STAVBA – mesačník pre stavebníctvo a architektúru, 2002, No. 6, pp. 58-60 (in Slovak)
- [6] BIELEK, M. - BIELEK, B.: Reconstruction of Roof of the Sports Hall in Považská Bystrica. In: STŘECHY – fasády, izolace, 2002, No. 3, pp. 64-67 (in Slovak)
- [7] BIELEK, M. - BIELEK, B.: Transparent Energy Climate Facades of Buildings – Historic Formation and Development. In: STŘECHY – fasády, izolace, 2002, Nos. 7-8, pp. 76-78 (in Slovak)
- [8] BIELEK, B. - BIELEK, M.: Glass Space as a Modern Concept for a Classic Winter Garden. In: Stavba, 2002, No. 4, pp. 56-60 (in Slovak)
- [9] BIELEK, M. - BIELEK, B.: Euro-Program of Transparent Systems for Low-Energy Buildings: Modern Slovak Window in a Wood Frame, Part 1. In: Interiér stavby – remesla, materiály, 2002, No. 2, pp. 30-31 (in Slovak)
- [10] DRŽKA, M.: Design of Ceramic Facings and Flaggings in an Interior. In: STAVBA, 2002, No. 5, pp. 56-58 (in Slovak)
- [11] DRŽKA, M.: Masonry Moisture – Examination and Methods of Treatment. In: Eurostav, 2002 (in Slovak)
- [12] FUČILA, J.: Facade Facings on Metal Basis. In: Stavební ročenka 2003, 2002, pp. 1-5 (in Slovak)
- [13] GIECIOVÁ, M.: Fires and Fire Fillers. In: Stavba, 2002, No. 12, pp. 33-35 (in Slovak)
- [14] GREŠKO, D.: Calculation of Critical Thickness of a Roof-Garden Layer and Computer Simulation of a Garden Layer for the Possible Reconstruction of Flat Roofs with a Roof-Garden Design. In: Střechy, fasády, izolace, 2002, pp. 16-17 (in Slovak)
- [15] GREŠKO, D.: Staircases in Buildings. In: Stavba, 2002, No. 1, pp. 36-37 (in Slovak)
- [16] GREŠKO, D.: External Flaggings. In: Stavba, 2002, No. 4, pp. 52-53 (in Slovak)
- [17] GRZNÁR, M.: Progressive Methods for Flat Roofs Laying. In: STŘECHY – fasády, izolace, 2002, No. 3, pp. 30-31 (in Slovak)
- [18] HRAŠKA, J.: Trends in Designing Energy-Effective Envelopes. In: Stavba, 2002, No. 12, (in Slovak)

- [19] HRAŠKA, J.: Building Energy and Indoor Environment Simulations in the Climatic Conditions of the Slovak Republic. In: Projekt a stavba, 2002, No. 12, pp. 27-31 (in Slovak)
- [20] CHMÚRNY, I.: The Effect of Glazing Spaces on the Thermal Protection of Buildings. In: Vytápění, větrání a instalace, 2002, No. 3, pp. 107-109 (in Slovak)
- [21] CHMÚRNY, I.: New Calculation European Standards for the Thermal Protection of Buildings. In: TZB-Haustechnik, 2002, No. 3, pp. 33-35 (in Slovak)
- [22] CHMÚRNY, I.: European Standards for Solar Thermal Systems. In: TZB-Haustechnik, 2002, No. 4, pp. 13 (in Slovak)
- [23] CHMÚRNY, I.: Thermal Protection of Buildings in the European Standards. In: Projekt a stavba, 2002, No. 3, pp. 28-29 (in Slovak)
- [24] JAKEŠ, E.: A Roof and a Chimney. In: STŘECHY – fasády, izolace, 2002, No. 2, pp. 16-18 (in Slovak)
- [25] MIKOLAI, I.: Thermal Insulating Systems of Building Envelopes. Requirements for Fire Safety. In: Eurostav, 2002, pp. 53-55 (in Slovak)
- [26] MIKOLAI, I. – OLBRÍMEK, J.: Fire Safety of Building Structures in the Light of New Regulations. In: Stavebnícka ročenka 2002, 2002 (in Slovak)
- [27] MINAROVIČOVÁ, K.: A Dwelling Entrance. In: Stavba, 2002, No. 5, pp. 40-42 (in Slovak)
- [28] OHRABLO, F.: Development of Creative Performance Abilities (of Engineers). In: Staviteľský almanach 2002, 2002, pp. 92-98 (in Slovak)
- [29] OHRABLO, F.: Reconstruction of Lipsko Railway Station. In: Projekt a stavba, 2002, No. 12, pp. 15-20
- [30] OLÁH, J.: Reconstruction of Roofing on the Towers of the Piarist Church of St. Francis Xavier, Trenčín. In: Strechy, fasády, izolace, 2002, No. 11 (in Slovak)
- [31] OLÁH, J.: Flat and Sloping Roofs in the Past and Present. In: Strechy, fasády, izolace, 2002, No. 1 (in Slovak)
- [32] OLÁH, J.: Defective Envelopes in the Structural Details of Flat Roofs. In: Strechy, fasády, izolace, 2002, No. 4 (in Slovak)
- [33] OLÁH, J.: The Alarming State of Roofs. In: Eurostav, 2002, No. 2 (in Slovak)
- [34] OLÁH, J.: Defects of Roof Structures. In: ASB, 2002, No. 2 (in Slovak)
- [35] PERNIŠOVÁ, A.: Wooden Sheds in Gardens. In: Urob si sám, 2002, No. 7, pp. 1-16 (in Slovak)
- [36] PUŠKÁR, A.: Wall Opening's Fillers and Light Envelopes from Structures to Standardization. In: Normalizácia 3, 2002, No. 4, pp. 6-7 (in Slovak)
- [37] ŠEBESTOVÁ, V.: Defects of Plastic-Framed Windows. In: Stavba, 2002, No. 5, pp. 46-47 (in Slovak)
- [38] TOMAŠOVIČ, P.: Noise Sources and Dissemination from Sanitary Service Equipment. In: TZB Haustechnik, 2002, No. 1, pp. 33-36 (in Slovak)
- [39] TOMAŠOVIČ, P.: Noise Attenuation of Pipe of Internal Waterpipeline and House Sewage System. In: TZB Haustechnik, 2002, No. 1, pp. 33-36 (in Slovak)

- [40] TURČEK, I.: Agricultural Tourist Centers in Slovakia. In: Stavba, 2002, Nos. 7-8, pp. 10-11 (in Slovak)
- [41] VARGOVÁ, A.: Principles of Structural Design. In: Stavba, 2002, No. 12, pp. 30-32 (in Slovak)
- [42] ZAJAC, J. - KARAKOVÁ, M.: Proper Design of Bramack Building System, Part 3. In: Znalectvo, 2002, No. 1, pp. 5-9 (in Slovak)
- [43] ZAJAC, J. - DLHÝ, D.: Thermal Properties of Building Structures and Buildings. In: Znalectvo, 2002, No. 2, pp. 4-5 (in Slovak)
- [44] ZAJAC, J.: Evaluation of Thermal Protection of Buildings according to STN 73 0540. In: Znalectvo, 2002, No. 2, pp. 10-12 (in Slovak)
- [45] ZAJAC, J. - ZAJAC, V.: Rustic Works and Wooden Roof Trusses. In: Znalectvo, 2002, No. 2, pp. 57-65 (in Slovak)
- [46] ŽILINSKÝ, J.: Thermal Analysis of Details of Ceramic-Based External Walls. In: Staviteľský almanach 2002, 2002, pp. 128-133 (in Slovak)
- [47] ŽILINSKÝ, J.: An Economic Investment. In: Dom a byt, 2002, No. 10, pp. 8 (in Slovak)

## **IX.2 Books and Textbooks**

- [1] BIELEK, B. – BIELEK, M. – PALKO, M.: Double Transparent Facades, Part 1: History, Evolution, Classification and Theory of Structural Design. Bratislava: Coreal, 2002 (in Slovak)
- [2] BIELEK, B. – BIELEK, M. – KUSÝ, M. – PAŇÁK, P.: Double Transparent Facades, Part 1: Evolution, Simulation, Experiment and Structural Design of Façade of NBS Building in Bratislava. Bratislava: Coreal, 2002 (in Slovak)
- [3] GRZNÁR, M.: Evaluation of Roof Structures. Bratislava: Verlag Dashöfer, 2002 (in Slovak)
- [4] HYKŠ, P. - GIECIOVÁ, M.: Building Structures II. Sloping Terrace Platforms - Stairs - Ladders. STU Bratislava, 2002 (in Slovak)
- [5] MIKOLAI, I.: Fire Protection of Buildings. Bratislava: STU – Faculty of Civil Engineering, 2002 (in Slovak)
- [6] OHRABLO, F., et al.: Manual of Typology – Flat Design. Bratislava: STU, MVRR SR, 2002 (in Slovak)
- [7] OHRABLO, F., PERNIŠOVÁ, A., PUŠKÁR, A.: Building Structures. Bratislava: STU – Faculty of Civil Engineering, 2002 (in Slovak)
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