DEPARTMENT OF THEORETICAL GEODESY

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I.1 Teaching activities

The Department's teaching activity provides the theoretical background for geodesy as a science concerning the geometric shape of the Earth and its gravity field. This is accompanied by the theory of measurements, methods of positioning, data processing, statistical analysis and informatics. Both theoretical and practical aspects are considered, emphasising current and future trends in geodesy. The Department covers education in subjects concerning geometric

geodesy, physical geodesy, geodetic astronomy, satellite geodesy, statistical processing of measurements, geoinformatics and computer science.

II. EQUIPMENT

II.1 Teaching and Research Laboratories

Observatory for Geodetic Astronomy - A research laboratory oriented towards geodetic positioning methods using natural and artificial celestial bodies and their integration with terrestrial geodetic methods.

Laboratory for Geodesy and Metrology - A research and educational workplace directed at the development of terrestrial measurement methods and techniques, laboratory tests, and calibration and comparison of geodetic instruments and devices.

Laboratory for Geoinformatics - Serves as a research and educational workplace focusing on applications of computer technologies for Geographical Information Systems and Land Information Systems.

The Modra-Piesok Geodynamic Reference Control Site is used for permanent positioning by the GPS method and for absolute and relative measurements of gravity acceleration as part of international geodynamic research projects. The permanent GPS observations at Modra-Piesok are included in the European Reference Frame that is used for construction and maintenance
of geodetic networks in Europe.

II. 2 Special Measuring Instruments and Computers

Total station:	Topcon GTS-6
Electronic theodolite:	Wild T 2000
Electronic distance meters:	DI 2000, Di 5
GPS receivers:	TRIMBLE 4000 SSE, TRIMBLE 4000 SSi (two units), Geoexplorer II, MARCH IIE (two units)
Levelling instruments:	Wild Na 2000, Zeiss Ni 002 (three units)
Astronomical instruments:	Wild T4, Circumzenithal RIGTC 100/1000, Circumzenithal RIGTC 50/500
Gravity meters:	Worden, Scintrex CG2
Laserinterferometric comparator:	LIK

III. TEACHING

III.1 Graduate Study

Subject	Semester	Hours Per Week		Lecturer
		Lectures	Seminars	
Computer Science	1	2	3	P. Černý
Geoinformatics	3	3	3	J. Chalachanová

Errors and Survey Adjustment Theory I.	3	3 – 2	J. Mičuda
Errors and Survey Adjustment Theory II.	4	2 – 2	J. Mičuda
Computer Programming	4	2 – 3	P. Černý
Physical Geodesy	5	2 – 2	M. Mojzeš
Geodetic Networks	5	3 – 3	E. Bučko
Land Information Systems	5	2 -2	J. Chalachanová
Geometric Geodesy I.	5	3 – 2	J. Mitáš
Geometric Geodesy II.	6	3 – 3	M. Mojzeš
Field Education in Geodetic Controls	6	3 weeks	E. Bučko
Geodetic Astronomy and Space Geodesy I.	7	2 – 3	L. Husár
Geodetic Astronomy and Space Geodesy II.	8	3 – 2	J. Melicher
Specialised Field Education	9	2 weeks	L. Husár
Special Seminar	9	0 – 3	Dep.Theor.Geod.
Databases and Information Systems in Geodesy	10	2 – 2	J. Chalachanová
Complex Geodetic Project	10	2 – 2	Dep.Theor.Geod.
Geodetic GPS Technologies	8	2 – 2	E. Bučko, J. Hefty
Analysis of GIS Spatial Data	8	2 - 2	J. Chalachanová
Satellite Geodesy	9	2 - 2	J. Hefty
Geodetic and Satellite Technologies in GIS	9	2 - 2	E. Bučko, J. Hefty
Mathematical Methods of Data Processing	7	2 - 2	J. Hefty
Integrated Geodesy	8	2 - 2	J. Hefty, M. Mojzeš
Geoid Determination Theory	7	2 - 2	M. Mojzeš J. Janák
Geodynamics	9	2 - 2	M. Mojzeš

V. RESEARCH PROJECTS

1. The Effects of Earth's Dynamics and Regional Atmospheric Processes in Continual Observations of the Central European GPS Network. VEGA Project 1/8252/01. Leader: Assoc. Prof. Ján Hefty, PhD.
2. UNIGRACE - Unification of the Gravity Network in Central and Eastern Europe. Supported by the EU under the INCO-COPERNICUS programme. National coordinator: Assoc. Prof. Marcel Mojzeš, PhD.
3. Geodetic Monitoring of Deformations of the Earth's Surface. VEGA Project 1/8251/01. Leader: Assoc. Prof. Marcel Mojzeš, PhD.
4. Research on and Realisation of a Geodetic Metrological System in the Slovak Republic. VEGA Project 1/7150/20. Leader: Assoc. Prof. Ernest Bučko, PhD.
5. Spatial Quality Standards for Design and Use of Geoinformation Databases. VEGA Project 1/8249/01. Leader: Peter Černý, PhD.

VI. COOPERATION

VI.1 Cooperation in Slovakia

1. Ministry of Transport, Post and Telecommunications of the Slovak Republic, Bratislava
2. Ministry of Agriculture, Bratislava
3. Ministry of the Environment, Bratislava
4. Authority of Geodesy, Cartography and Cadastre, Bratislava
5. Geodetic and Cartographic Institute, Bratislava
6. Research Institute of Geodesy and Cartography, Bratislava
7. Railways of the Slovak Republic, Bratislava
8. Air Traffic Control Administration of the Slovak Republic, Bratislava
9. Geophysical Institute of the Slovak Academy of Science, Bratislava
10. Faculty of Mathematics and Physics of Comenius University, Bratislava
11. Dionýz Štúr State Geological Institute, Bratislava

VI.2 International Cooperation

1. Warsaw University of Technology, Poland
2. FÖMI - Satellite Geodetic Observatory, Penc, Hungary
3. Technical University of Budapest, Hungary
4. Technical University of Vienna, Austria
5. Faculty of Mining and Geology, Mining University, Ostrava, Czech Republic
6. Institute of Cartography and Geodesy, Frankfurt am Main, Germany
7. Czech Technical University, Prague, Czech Republic
8. Technical University of Brno, Czech Republic
9. Technical University of Dresden, Germany
10. Department of Geodesy and Geomatics Engineering, University of New Brunswick, Fredericton, Canada

VII. THESES

VII.1 Graduate Theses

No.	Student´s Name	Title	Supervisor
1.	Z. Antalová	Building Special High-Accuracy Horizontal Geodetic Networks	J. Mičuda
2.	M. Bieliková	Lambert Projection of Geocentric Ellipsoid in the Region of Slovakia	M. Mojzeš
3.	I. Blažek	Calibration of the Relative Gravimeter	M. Mojzeš
4.	P. Forgách	Using the GIS Microstation Geographics System for Designing Public Greenery	P. Černý
5.	J. Gatial	Transformation of WGS84 3-Dimensional Coordinates to a Planar System Without an Identical Points	J. Hefty
6.	Š. Gengel	Analysis of Precision of Transformation of the World Geodetic System 1984 into Local Horizontal Systems with Respect to the Location	J. Melicher

		of a Tangent Point	
7.	J. Gréner	Application of Tensors in Geodesy	L. Husár
8.	T. Hudcovič	Investigation of the Reliability of Gravity Data Interpolated by a Digital Elevation Model	J. Janák
9.	J. Janíčková	Estimation of Local Horizontal Network Parameters Using Terrestrial and GPS Measurements	J. Mičuda
10.	T. Klus	Geodetic Horizontal Networks in Engineering Practice	J. Mičuda
11.	M. Kováč	Development of Application Software Using Effective Algorithms	P. Černý
12.	O. Krutošík	Horizontal Accuracy of Objects in Geoinformation Systems	P. Černý
13.	M. Kubačka	Application of Horizontal Networks in Geodetic Practice	J. Mičuda
14.	L. Lobodková	Adjustment of a Horizontal Geodetic Network	J. Mičuda
15.	P. Lukáč	Determination of the Parameters of Selected Astronomical and Geodetic Instruments	J. Melicher
16.	K. Maliňáková	Relative Positioning by the Global Positioning System Using Double Differences	J. Melicher
17.	M. Malíšek	Testing the Accuracy of a Quasigeoid Model in Slovakia	M. Mojzeš
18.	M. Marček	Detection of Relative Vertical Movements	J. Mitáš
19.	M. Matyšák	Mobile and On Site Solution of Geo-Information Systems	E. Bučko
20.	P. Pavlík	Comparison of Precision of Transformed Coordinates with Jung and Polynomial Transformations	J. Hefty
21.	T. Pribul	Continuation of Gravity Data from the Earth's Surface to the Geoid	J. Janák
22.	M. Rehák	Kalman's Filtering and the Use of This Method in Analysis of Long-lasting GPS Observations	J. Hefty
23.	P. Šurnovský	Evaluation of an Empirical Formula to determine the Accuracy a Position by GPS	J. Hefty
24.	M. Tomko	Object-Oriented GIS in the Microstation Geographic Environment with the Oracle System's Support	E. Bučko
25.	P. Varga	Absolute Positioning and Determination of an Azimuth Using Astronomical Methods and the Global Positioning System	J. Melicher
26.	J. Žáčik	Statistical Evaluation of Measurements Performed by the CZ50/500 Astronomical Instrument	L. Husár

IX. PUBLICATIONS

IX.1 Journals

[1] BECKER, M. – CRISTEA, E. – FIGURSKI, M. – GERHATOVA, L. – GRENERCZY, G. – HEFTY, J. – KENYERES, A. – LIWOSZ, T. – STANGL, G.: Central European Intraplate Velocities from CEGRN Campaigns. Reports on Geodesy, 1 (61), 2002, pp. 83-89

[2] HEFTY, J. – GERHÁTOVÁ, Ľ. – KÁRTIKOVÁ, H.: The Role of GPS Permanent Stations in the Realisation of a Geocentric Reference Frame. Reports on Geodesy, 4 (59), 2001, pp. 39–50

[3] MELICHER, J.: Precision Analysis of Position and Length Determination Through Global Positioning System's Phase Observation. Reports on Geodesy, 5 (60), 2001, pp. 7-15

[4] CZARNECKI, K. - MOJZEŠ, M. - PAPČO, J.: Analysis of GPS Measurement Campaigns in the Tatra Mountains. Reports on Geodesy 1 (61), 2002, pp. 73-76

[5] HUSÁR, L. - HEFTY, J.: Astronomically Determined Positions - Reliable Geometric Reference for the Maps of Samuel Mikovini (1700-1750). Slovak Journal of Civil Engineering 1, Vol. 10, 2002, pp. 31-36

[6] HÁJEK, M. - MELICHER, J. - BARTALOŠ, J.: The Bratislava Meridian on Mikovinis`s Maps. Slovak Journal of Civil Engineering 1, Vol. 10, 2002, pp. 24-30

[7] MELICHER, J.: Using Tautochronous Effects and Radio Sources in the Universe for Realisation of Maps and Reference Systems. Kartografické listy 10, 2002, pp. 44-51 (in Slovak)

[8] MITÁŠ, J. - MIČUDA, J. - BUČKO, E.: Altitude Changes at the Hlohovec Comparison Base. Geod. a kart. obzor 10, 2002, pp. 185-188 (in Slovak)

IX.3 Conferences

[1] HEFTY, J. – GALGONOVÁ, R.: Site Velocities Obtained from Central Europe Regional Geodynamics Project and Their Interpretation in Form of Surface Deformations. In: Adam and Schwarz (eds.), Vistas for Geodesy in the New Millennium. IAG Symposia, Vol. 125. Springer, 2002, pp. 579-583

[2] BECKER, M. – CAPORALI, A. – FIGURSKI, M. – GERENERCZY, G. – KENYERES, A. – HEFTY, J. – MARJANOVIC, M. – STANGL, G.: A Regional ITRF Densification by Blending Permanent and Campaign Data – The CEGRN Campaigns and the Central European Velocity Field. In: Adam and Schwarz (eds.), Vistas for Geodesy in the New Millennium. IAG Symposia, Vol. 125. Springer, 2002, pp. 53-58

[3] HEFTY, J. - MELICHER, J. – HUSÁR, L. – JANÁK, J.: Using the Circumzenithal to Determine Deflections of Vertical in the Field. In: Proceedings of 100th Birth Anniversary of Prof. Emil Buchar. Prague 2002, pp. 53–67 (in Slovak)

[4] HEFTY, J.: Tidal Variations of Station Coordinates Observed in a Regional GPS Network. Journees 2001 Systemes de reference spatio-temporels. Observatoire Royal Belgique, 2002

[5] HEFTY, J. – GERHÁTOVÁ, Ľ.: Determination of the Geocentric Coordinates Using Permanent GPS Stations in Slovakia. In: GPS – Differential Systems and RTK. Brno, VUT, Ústav Geodezie, 2002, pp. 49–52 (in Slovak)

[6] MOJZEŠ, M. - KALAFUT, M.: Buchar Correction and Its Role in Determination of Transformation Parameters. In: Proceedings of 100th Birth Anniversary of Prof. Emil Buchar. Prague 2002, pp.143-146 (in Slovak)

[7] MOJZEŠ, M.: Accuracy Analysis of the DMR-2 Digital Elevation Model in Euroopean terrestrial reference system 89. In: 8th International Polish-Czech-Slovak Geodetic Days. Polanica, Zdrój 2002, pp. 45-51 (in Slovak)

[8] KORČÁK, P. - STANĚK, V. - ŠIFRA, J.: Geodetic Network for the "Most Košická - Bratislava" Bridge Construction. In: 8th International Conference on Geodesy and Cartography in Traffic. Ostrava 2002, pp. 83-90 (in Slovak)

[9] CHALACHANOVÁ, J.: Application of a Digital Elevation Model in Geo-Information Systems. In: 8th International Polish-Czech-Slovak Geodetic Days. Polanica, Zdrój 2002, pp. 5-12 (in Slovak)

[10] KÁRTIKOVÁ, H. – HEFTY, J.: Modeling Stochastic Variations in Position of GPS Permanent Stations. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 149-154 (in Slovak)

[11] PLÁNOVSKÝ, I. – HEFTY, J. – GERHÁTOVÁ, L.: Fundamental Problems of Reliable Positioning in Precise GPS Applications. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 69-74 (in Slovak)

[12] IGONDOVÁ, M. – HEFTY, J.: Determination of the Water Vapour Content of the Atmosphere Through GPS. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 83-86 (in Slovak)

[13] HEFTY, J.: Short-Term Variations of Permanent GPS Stations. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 155-156 (in Slovak)

[14] HEFTY, J.: Role of a Permanent GPS Network in Determination of Geocentric Coordinates. 10th Slovak Geodetic Days. Bratislava, VTS Geodézia Bratislava, 2002, pp. 39-44 (in Slovak)

[15] MELICHER, J.: From a Moon Eclipse to Quasars. In: 240 Years of Technical University Education in Slovakia. Bratislava, STU, 2002, pp. 71-80 (in Slovak)

[16] MELICHER, J.: Relation between Celestial and Terrestrial Reference Systems. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 11-22 (in Slovak).

[17] MOJZEŠ, M.: Realisation of the Gravity Reference System in Slovakia. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 101-110 (in Slovak)

[18] ČUNDERLÍK, R. - MIKULA, K. - MOJZEŠ, M.: 3D BEM Application to Neumann Geodetic BVP Using a Collocation with Linear Basis Functions. In: Proccedings of ALGORITMY 2002, Conference on Scientific Computing. Podbanské 2002, pp. 268-275

[19] JANÁK, J.: Effect of Variations in The Earth's Spin Velocity on the Gravity. In: Geodetic Reference Systems. Bratislava, STU, 2002, pp. 127-134 (in Slovak)

[20] MITÁŠ, J. - BUČKO, E. - MIČUDA, J.: Metrological Aspects of Geodetic Measurements. In: 10th Slovak Geodetic Days. VTS Geodézia Bratislava, 2002, (in Slovak)

[21] IVÁNOVÁ, I. - CHALACHANOVÁ, J.: Terminology in Sandardizing of Geographic Information. In: Geographical Information – Terminology in ISO and CEN Technical Norms. Bratislava, 2002, pp. 19–22 (in Slovak)

[22] CHALACHANOVÁ, J. - IVÁNOVÁ, I.: Quality Assessment Model of a Spatial Database. In: Activities in Cartography, GÚ SAV Bratislava, 2002, pp. 71-78 (in Slovak)