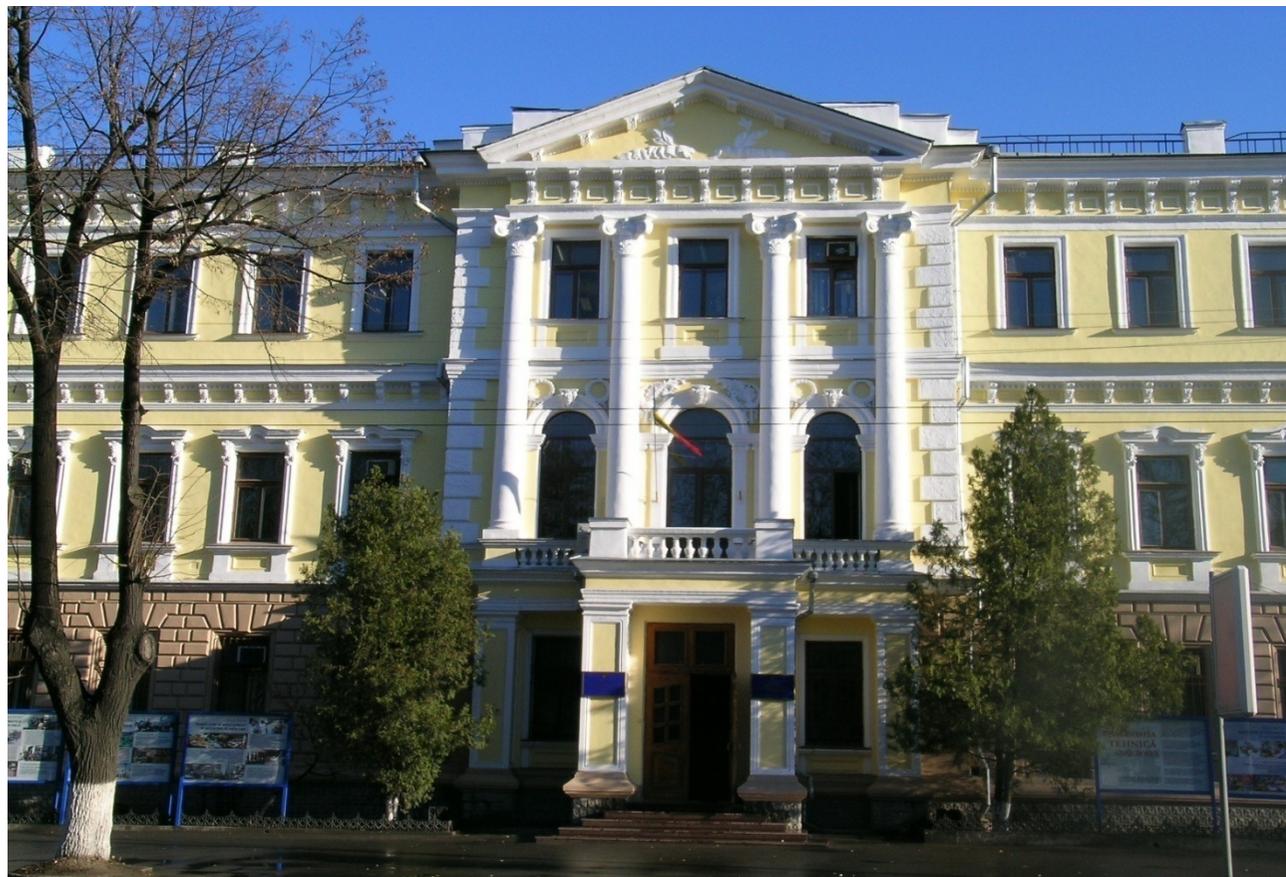




Technical University of Moldova



***United Nations/Latvia Workshop on the Applications of Global Navigation
Satellite Systems (GNSS), Riga, Latvia,***

14 - 18 May 2012



Technical University of Moldova

GNSS applications in the educational system of the Technical University of Moldova

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*United Nations/Latvia Workshop on the Applications of Global Navigation
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SUBJECTS

- **History**
- **Missions**
- **Structure**
- **Following The Bologna Process**
- **ISO Certification**
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- **Research activities**
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- **Initiatives and trends**

History



- **Founded in 1964, with the name "The Polytechnic Institute of Chisinau" on the basis of some engineer and economical specialties within the State University of Moldova.**
- **At present TUM has a contingent of more than 15790 students, 80 specialties and specializations within 10 faculties**
- **At TUM there are also organized postgraduate studies (about 690 students continue their Master's degree studies and about 134 continue PhD postgraduate studies).**
- **During about 48 years there were prepared over 79000 specialists.**



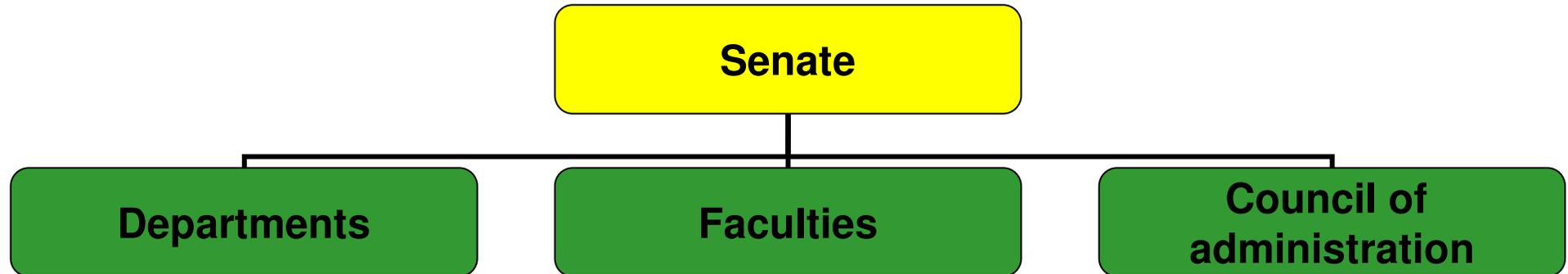
Principal Missions

The principal mission of the Technical University of Moldova are the following:

- to foster excellent teaching, research and service for education
- to offer qualitative studies by the combining of education, research and innovation
- to form the personality of a creative and insightful student.



Structure



- Power engineering**
- Engineering and management in mechanics**
- Engineering and management in machine building**
- Computers, Informatics and micro electronics**
- Radio-electronics and telecommunication**
- Technology and management in food Industry**
- Textile Industry**
- Cadastre Geodesy and Constructions**
- Urban planning and Architecture**
- Economy and business**

ISO Certification



**On 19 April 2011
The University was
certificated with SR
EN ISO 9001:2008
by SIMTEX-OC**



The Bologna Process

Starting from 2005 University adapted three cycles system of education:

- **Bachelor Degree – 3-4 years (180-240 ECTS)**
- **Master Degree – 1.5 years (90 ECTS)**
- **PhD– 3 year (240 ECTS)**
- **Curricula tend to become compatible from one university to the other Students are easily moving from one university to the other**



Department of Geodesy, Cadastre and Geotechnics

- The Department of *Geodesy, Cadastre and Geotechnics* (GCG) is a component part of the Faculty of Cadastre, Geodesy and Construction of Technical University of Moldova
- In 1995 were started a new specialty - *Geodesy, Topography and Cartography* with assistance of Technical University of Civil Engineering Bucharest
- GCG was founded in 1997 on the basis of the Department of *Engineering geology and foundations*



Department of Geodesy, Cadastre and Geotechnics

The Department ensures the educational process at the following specialties:

- **Geodesy, Topography and Cartography**
- **Mine exploitation**

- **The staff of the Department is also responsible for teaching of subjects regarding the following fields - geotechnics, foundations, geology, protection of towns and villages, etc., which are taught in Romanian and Russian**

- **They also elaborate didactic materials, organize laboratory works and practices according to the curriculum**



Department of Geodesy, Cadastre and Geotechnics

Four years of study of the following disciplines:

**Topography,
Geodesy (elipsoidal, physical, GNSS),
Geoinformatics,
Photogrammetry,
Remote Sensing,
Cadastre,
Surveying Engineering,
Survey,
GIS,
Cartography,
Law,
Management,
etc...**



Department of Geodesy, Cadastre and Geotechnics

Main objectives - to prepare surveying engineers for:

- **Development and maintaining the Geodesic Networks**
- **Mapping of different scales (creating of maps), of topographic plans, cadastral maps, etc.**
- **Surveying and buildings monitoring**
- **Exploitation and operation of geoinformational systems**



Department Achievements

- **2001-2003 Cooperation in the frame of Project “Modernization of educational System in Cadastre” Sweden International Development Assistance (SIDA)**
- **2004–2006 Project “Education in Geographical Information Technology” supported by EU, TEMPUS in cooperation with:**
 - **KTH Department of Geodesy and Geoinformatics, Sweden**
 - **Special School for Public works, Paris, Surveying Department**
- **2010 - Project “Development of a High Capacity Real-Time GNSS Positioning Service for Moldova (MOLDPOS)” – University of Applied Sciences, Karlsruhe, Germany**
- **2010-2013-511322-TEMPUS-1-2010-SE-JPCR Geographic information technology for sustainable development in Eastern neighbouring countries (GIDEC)**

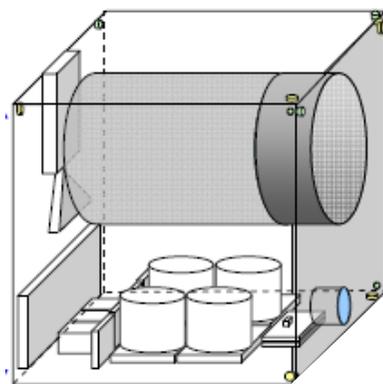
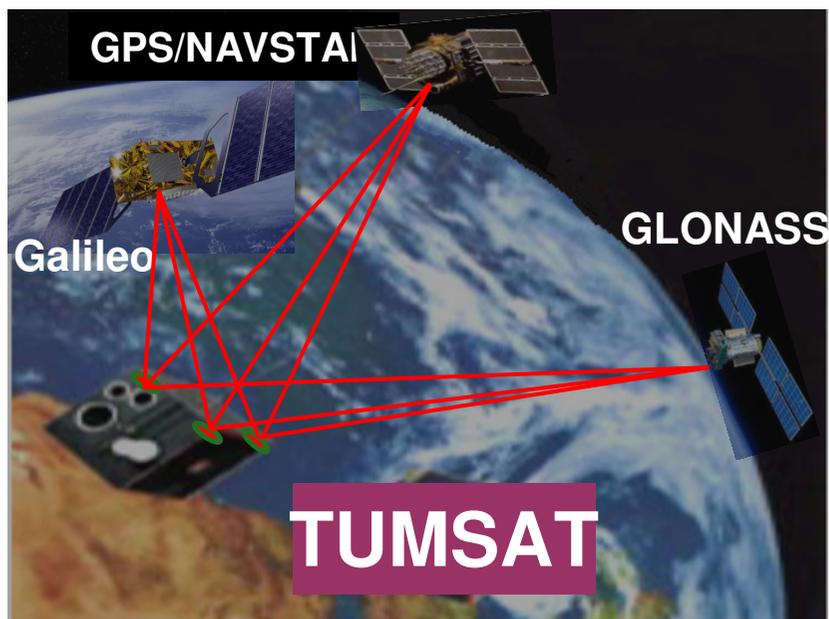


Research activities

The main directions of research activities:

- **Study and implementation of Geographic information standards**
- **Development of quasigeoid models for territory of Republic of Moldova**
- **Development of a High Capacity Real-Time GNSS Positioning Service for Moldova (MOLDPOS)**
- **Investigation of methods of landslides monitoring**
- **Participation in the EEGS2 Project EGNOS Extension to Eastern Europe: Applications in the Frame of FP7 Program**

Development of Technical University of Moldova SATellite



TUMSAT - Technical University of Moldova SATellite with remote sensing mission under construction in collaboration with:

- Siegen University, Institute for Data Communications Systems, Germany
- Romanian Space Agency ROSA
- Karlsruhe University for Applied Sciences, Germany
- Institute of Cosmic Research, Moscow, Russia

- **GNSS permanent station**
- **Pentium PCs (desktop/laptop, server/WS)**
- **Network accessories for internet connection + Email server**
- **Plotter, printers, scanners, LCD projectors**
- **10 ArcGIS licenses**
- **2 Trimble geodetic GPS receivers**
- **2 Leica TTC**
- **1 Leica Digital level NA 3003**
- **1 digital photogrammetric WS from Geosystem**





GNSS Curriculum development

Course code	S.07.O.042
Course name	Satellite Geodesy
Semester	7
ECTS credits	5 c
Class hours	Lectures: 30 hrs. Practical works 30 hrs. Laboratory works: 15 hrs.
Learning outcomes (aims/objectives)	Definitions of geodetic reference systems and practical skills of coordinate transformations. Acquire basic knowledge on GNSS technique, GNSS equipment and software. Field GNSS measurements and processing. GNSS applications.



GNSS Curriculum development

LECTURES (30 hours)

1. Introduction in satellite geodesy: conventional navigation, background, concepts and evolutions of Global Navigation Satellite Systems (GPS, GLONASS, Galileo, BeiDou/COMPASS) and Regional Positioning Systems (IRNSS, QZSS). Comparison of GNSS with other navigation systems. - 2 (h)
2. Reference systems: terrestrial, celestial and orbit coordinate reference system. Height systems. Geoid. Time systems, synchronization and data conversion - 4 (h)
3. Satellite orbits: Orbital parameters, Orbital motion representation, Determination of satellite position, visibility and ground tracks, Orbits dissemination - 4 (h)
4. GNSS Receivers architecture: technology, Antennas and propagation channels, signal - processing system hardware and software techniques - 4 (h)
5. GNSS positioning techniques: GNSS measurements (pseudoranges and carrier phase), absolute single position determination technique, differential position determination methods. Errors in GNSS measurements 4 (h)
6. GNSS measurements and processing: Planning data collection with GNSS. Conducting GPS Field Survey. Post-Processing of differential GNSS measurements. GNSS Network adjustment - 4 (h)
7. Satellite Based Augmentation Systems: Wide Area Augmentation System (WAAS), European Geostationary Navigation Overlay Service (EGNOS), System of Differential Correction and Monitoring (SDCM) - 4 (h)
8. GNSS Networks: Global, regional and local GNSS Permanent Networks and geodetic infrastructure for real positioning services (IGS, EUREF-IP, EUPOS, MOLDPOS) – 4 (h)



GNSS Curriculum development

PRACTICAL WORKS (30 hours)

- 1. Coordinate transformations between International Terrestrial Reference System (ITRS) and European Terrestrial Reference System (ETRS) - Practical works 8 (h)**
- 2. Time and data conversion - Practical works 6 (h)**
- 3. Satellite coordinates calculation - Practical works 8 (h)**
- 4. GNSS applications: GIS/mapping, surveying, natural hazards management, earth sciences, natural resources, precise agriculture, infrastructure – Seminar 8 (h)**

LABORATORY WORKS (15 hours)

- 1. GNSS receivers configuration. LCD display and key function. Principles of display. Data input and output - 3 (h)**
- 2. GNSS measurements (Static, Fast static and RTK) using Trimble R8 GNSS receiver - 4 (h)**
- 3. GNSS measurement processing using specialised software- 4 (h)**
- 4. GNSS network adjustment using specialised software- 4 (h)**



Initiatives and trends

- organization of training courses for specialists in production in collaboration with Moldavian Geodetic Union
- Development of GNSS laboratory
- development of national and international educational and research projects
- development of national relations and international collaboration etc.



Technical University of Moldova

Faculty Cadastre Geodesy and Constructions

THANK YOU FOR ATTENTION

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