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Development of a Complete Graduation Training Centre for Geomatics and GNSS

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PREAMBLE

During the last 25 years, the blow up of new GNSS and EO technologies (both based on satellite data) was more dynamic than an educational system (unable to show ability for immediate reaction at the R&D activities and industry progress).

In order to ensure the synergy between the educational system and the technological evolution, it was necessary to replace some classical disciplines (as the detailed study of opto-mechanical theodolites or analogical photogrammetry) with new courses oriented to the study of satellite systems and their benefit for the domain.
The inherent conservative behavior of the geodetic community postponed the compulsory modification of classical academic syllabus.

As consequence, the introduction of new topics, permitting to get ready specialists with a competitive EO and GNSS knowledge, become a priority for some dynamic academic structures.
Land Reclamations and Environmental Engineering Faculty of Bucharest (FIFIM)

The Faculty of Land Reclamations of the University of Agronomical Sciences and Veterinary Medicine of Bucharest acts, since 1934, as Civil Rural Engineering educational structure. Evidently, several decisions modified the status and the location of the specialization, but any syllabus contained some geodetic disciplines (as special topography or geodesy 1934).
1990 year has to be considered as a first benchmark of modernization of the faculty’s structure. First of all, adding as main specialization an Environmental Engineering department, the faculty enlarged the horizon of knowledge.

Even if both departments (Land Reclamations and Environmental Engineering) have included in the syllabus courses of Topography, it was necessary to complete the arch of specializations with a department for earth measurements and cadastre.
Starting 1997, the department Cadastre is acting as independent at college level specialization (3 years of studies).

Since 2005 (the second important benchmark), the Cadastre department is reorganized and upgraded at license level (4 years of studies) acting currently as “Earth Measurements and Cadastre” specialization.
Tacking benefit of Romanian Space Agency’s support, a new syllabus was elaborated keeping in mind several criteria:

• A graduated engineer has to understand and apply the recommendations of UNISPACE III conference;
• A graduated engineer has to understand what is the GNSS;
• A graduated engineer has to be educated as an advanced GNSS user;
• It is impossible to educate without a modern infrastructure;
• It is impossible to educate without a multidisciplinary practicing group of professors (not only theoreticians).
In fact the “Earth Measurements and Cadastre” specialization prepares engineers at license level for applying the cadastre in Romania by using methods for digital cartography, GIS and Earth Observation technologies.

Tacking into account the Bologna Accords (having as purpose the creation of an European Higher Education Area by making academic degree standards and quality assurance standards more comparable and compatible throughout Europe), starting autumn 2010 a master of science cycle on Applied Geomatics (2 years) will be implemented.
Proposed disciplines for “Applied Geomatics” master degree

- Spatial data infrastructures and data standards;
- Digital processing of image data;
- Constitutive elements of bio-geo-sphere;
- Programs and applications for Earth Observation;
- Thematic cartography;
- Geoinformation for risks management;
- Geopolitics and strategies of Space;
- Interoperability of positioning systems
The Supporting Infrastructure

6 specialized laboratories:
- Remote Sensing
- GIS 1
- GIS 2
- Photogrammetry
- Topography
- Cadastre

8 complementary laboratories:
- Computer graphics
- Geodynamics
- Meteorology and Climatology
- Geotechnics
- Soil science (Pedology)
- Cadastre
- Multimedia
- Computer sciences
Remote Sensing Laboratory

Disciplines
- Image processing
- Cartographical modeling
- Photo-interpretation
<table>
<thead>
<tr>
<th>Equipment</th>
<th>Year</th>
</tr>
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<tbody>
<tr>
<td>21 PC systems, Pentium IV, HDD 150 GB, 1Gb RAM, LCD SONY 19”</td>
<td>2007</td>
</tr>
<tr>
<td>Notebook – 1 buc</td>
<td>2009</td>
</tr>
<tr>
<td>Videoprojector Benq</td>
<td>2007</td>
</tr>
<tr>
<td>SmartBoard</td>
<td>2007</td>
</tr>
<tr>
<td>Working Station HP 4600, XEON, HDD 250 GB, 2Gb RAM, placa video 1 MB,</td>
<td>2008</td>
</tr>
<tr>
<td>double display SAMSUNG 19”</td>
<td></td>
</tr>
<tr>
<td>Plotter HP A0</td>
<td>2005</td>
</tr>
<tr>
<td>Scanner HP A4</td>
<td>2007</td>
</tr>
<tr>
<td>Printer color Hp 1800 c A3 format</td>
<td>2007</td>
</tr>
<tr>
<td>Laser Printer - Hp 2015 DN A4 format</td>
<td>2008</td>
</tr>
<tr>
<td>Photocopier Gestetner 3222, duplex, sorter, finisher, A3</td>
<td>2007</td>
</tr>
<tr>
<td>21 ARCGIS – ARCVIEW 9.3. licensed software</td>
<td>2008</td>
</tr>
<tr>
<td>Unlimited LEOWorks 3.0</td>
<td>2008</td>
</tr>
<tr>
<td>LEICA GEO OFFICE</td>
<td>2008</td>
</tr>
<tr>
<td>WINDOWS XP PRO, Microsoft Office Professional</td>
<td>2008</td>
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</tbody>
</table>
GIS Laboratory (1)

Disciplines
- Geographic Information Systems
- Information Systems in Cadastre
## GIS Laboratory (1)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Systems HP Processor INTEL CORE 2 DUO, HDD 250 Gb, 2 Gb RAM, DVD writer, Samsung LCD WIDE 22&quot;</td>
<td>2008</td>
</tr>
<tr>
<td>Working stations HP 4600, XEON, HDD 250 GB, 2Gb RAM, video 1 MB, double monitor SAMSUNG 19&quot;</td>
<td>2008</td>
</tr>
<tr>
<td>Server HP PROLIANT ML 350, INTEL XEON</td>
<td>2008</td>
</tr>
<tr>
<td>Laptop ASUS K50IN, 15.6”HD/LED, procesor Intel pentium DUAL CORE T4200 : 2.0 GHz FSB 800MHz, 1M L2 Cache HDD 320 GB, 4 GB RAM, placa video NVIDIA GeFORCE G102M CUDA 512 MB, DVD-writer dual layer - 4 buc</td>
<td>2009</td>
</tr>
<tr>
<td>Smart board (Penboard)</td>
<td>2009</td>
</tr>
<tr>
<td>Plotter HP A0</td>
<td>2009</td>
</tr>
<tr>
<td>Plotter CANON IPF 710, color, A0+ format</td>
<td>2009</td>
</tr>
<tr>
<td>Scanner CANON COLORTRAC SMARTLF CX, A0</td>
<td>2009</td>
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<tr>
<td>Scanner HP SCANJET G3110</td>
<td>2009</td>
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<tr>
<td>Printer KYOCERA FS-9130 DN, Laser color, USB, ETHERNET</td>
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<tr>
<td>2 synchronized videoprojectors</td>
<td>2009</td>
</tr>
<tr>
<td>25 licenses ARCGIS – ARCVIEW 9.3. –.3 D ANALYST LAB KIT PAK SPATIAL</td>
<td>2009</td>
</tr>
</tbody>
</table>
GIS Laboratory (2)

Disciplines
- Geographic Information Systems
- Information Systems in Cadastre
GIS Laboratory (2)

Field equipment
Field activities performed by a Ph.D. student
<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Details</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working station HP 4600, processor XEON, HDD 250 GB, SONY 19&quot;</td>
<td>4 buc</td>
<td>2008</td>
</tr>
<tr>
<td>Laptop ASUS K50IN, 15.6&quot; HD/LED, processor Intel pentium DUAL CORE</td>
<td>T4200 : 2.0 GHz FSB 800MHz, 1M L2 Cache HDD 320 GB, 4 GB RAM, placa video</td>
<td>2009</td>
</tr>
<tr>
<td>Scanner CANON COLOTRAC SMARTLF CX, format A0</td>
<td></td>
<td>2009</td>
</tr>
<tr>
<td>Printer HP CP 3525 DN, Laser color A4</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Printer HP 8600, Laser color A3</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Videoprojectore Toshiba - 1 buc</td>
<td></td>
<td>2009</td>
</tr>
<tr>
<td>LEICA HDS LASER Scan Station 2</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>LEICA SMART STATION 1200+</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Autor GIS – VW Multivan 4 MOTION</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>3D ANALYST LAB KIT PAK si SPATIAL</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Leica Cyclone</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Leica Geo Office</td>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>WINDOWS Server, WINDOWS XP PRO, Microsoft Office Professional</td>
<td></td>
<td>2008</td>
</tr>
</tbody>
</table>
Topography and Cadastre laboratories
The modern facilities already offered the possibility to organize international training events on the GNSS / EO domains

1. GEOSS capacity building workshops, Bucharest, Romania, May 3-4, 2010

BRINGING GEOSS SERVICES INTO PRACTICES WORKSHOP
for teaching participants how to install, configure and deploy a set of open source software to publish and share data and metadata through the Global Earth Observation System of Systems (GEOSS) using OGC web services & ISO standards.

GEPIIC WORKSHOP
In the framework of the enviro GRIDS projects, a workshop on the GIS-based EPIC model.
2. Romanian Space Agency (ROSA) in cooperation with the European Space Agency (ESA) and the German Aerospace Center (DLR) organized a five-days ’’INTENSIVE RADAR REMOTE SENSING COURSE’’ between 26 – 30 October 2009.

The training course was focused on radar remote sensing theory and applications:
- theoretical fundamentals of radar remote sensing and introduction to SAR applications
- practical sessions using SAR data with focus on TerraSAR-X imagery for applications in water / oil detection and mapping
As shown previously, the actual infrastructure offers the possibility to host complex training events and support activities for UN or other international organizations.

The active participation of the faculty staff at each scientific activity stimulates the understanding of GNSS and EO technologies in view of permanent use in environmental projects.

In fact, the benefit is evident and fair for both parties, organizers and hosting faculty...
Thanks for your attention!