PROFESSIONAL ASPECTS AND SPECIFICITIES OF THE GEOMATIC SCIENCES AND SURVEYING ENGINEERING EDUCATION IN MOROCCO
A UNIQUE EXPERIENCE

Director: Prof. El Hassane SEMLALI

OUTLINE

- INTRODUCTION
- HISTORICAL OVERVIEW
- DISTRIBUTION OF PEDAGOGICAL ACTIVITIES
- HUMAN AND MATERIAL RESSOURCES
- PEDAGOGICAL ACTIVITIES OF THE ENGINEERING CYCLE
- SPECIFICITIES OF THE CURRICULUM
- CHARACTERISTICS OF THE PRACTICAL EDUCATION PROGRAM
- RESEARCH & CONTINUING EDUCATION
- CONCLUSION
INTRODUCTION

IAV Missions
Development & Continuing education
Research
Education

Engineer
Master
Doctorate

INTRODUCTION

IAV

Geomatic & surveying engineering
Horticultural engineering
Veterinary medicine
Rural Engineering

IAV

Engineers in agronomy
Agro-food engineering

Geomatic & surveying engineering

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011
HISTORICAL OVERVIEW

1970 to 1988 (4-year)
needs of the agriculture Ministry
- 437 engineers
- 14 Africa (Tu, Ni, Mau, Cam, Sénég)

1988 to 2004 (6-year)
needs of the professional users & rapid technological developments
- 551 engineers
- 13 from Africa (Benin, Burkina, Togo…)

2004-2005 (5-year)
92 engineers
- reforms required by the higher education ministry
- law 01-00 related to restructuring the university

1080 Total engineers in 2010

2009 accreditation program /national education standards/
School of doctorate

CYCLES OF EDUCATION PROGRAM

First cycle
- Common first year (APESA)

Preparatory Cycle
- Bachelor (M, P, MI)
- DEUG, DUT (topographie)

Engineering Cycle
- Semestre S1
- Semestre S2
- Semestre S3
- Semestre S4
- Semestre S5
- Semestre S6
PEDAGOGICAL ACTIVITIES OF THE FIRST CYCLE

- Training: 9%
- Maths: 16%
- Computer Science: 9%
- Statistics: 10%
- Physics: 23%
- General: 9%
- Languages: 23%

Pedagogical Activities of the First Cycle

DEPARTMENTS & LABO

- School GSES
  - Dept Photogrammetry & Cartography
  - PC labo
  - Dept Geodesy & Surveying
    - Labo Photogrammetry
    - Labo GIS-Remote Sensing
    - Labo Geodesy & GNSS
    - Labo Surveying
**Human Resources**

Permanent Professors & AP: 12 PhD, 5 MSc

<table>
<thead>
<tr>
<th>DOCTORAT</th>
<th>UNIVERSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photogrammétrie</td>
<td>Université Laval Canada</td>
</tr>
<tr>
<td>Télédetection et SIG</td>
<td>Université de Sherbrooke, Canada</td>
</tr>
<tr>
<td>Doctorat Informatique</td>
<td>INSA LYON - FRANCE</td>
</tr>
<tr>
<td>Doctorat d’Etat</td>
<td>IAV Hassan II Et Université de Minnesota</td>
</tr>
<tr>
<td>Doctorat es-sciences</td>
<td></td>
</tr>
<tr>
<td>Département de Géomatique</td>
<td>Université de Liège</td>
</tr>
<tr>
<td>doctorat Sciences Géodésiques-Géodynamiques</td>
<td>IAV Hassan II</td>
</tr>
<tr>
<td>PhD en Télédetection</td>
<td>l’université de Sherbrooke, Canada</td>
</tr>
</tbody>
</table>

FIG WW MARRAKECH 2011  MAI 2011
**SCIENTIFIC EQUIPMENT RESOURCES**

- Traditional and modern instruments
- Total stations, levels, GPS, permanent station
- PCs, scanners, plotters, Photogrammetric stations,
- Computer science equipment
- Microstation MGE, AutoCad, AGIS
- Analytic Instrument
  - SD2000, LPS
  - ERDAS
  - TGO, LGO, GNSS
  - Covadis

**PEDAGOGICAL ACTIVITIES OF THE ENGINEERING CYCLE**

Three categories of education skills:

- **Scientific and technical education** (1920 hours): 74%
- **Management education** (360 hours): 14%
- **Languages and communication skills** (300 hours): 12%

Total volume of hours: 2580
SCHOOL OF GEOMATIC SCIENCES & SURVEYING ENGINEERING

SPECIFICITIES OF THE CURRICULUM

- Covers Geomatic sciences and surveying engineering
- Polyvalent engineers for any department (agriculture, habitats, roads, urban and rural management, ..).
- Covers new Space technologies, data management & communication
- Regularly updated (4 years)
- Theoretical and practical lessons as well.
- The practical part covers around 30% of total VH

FIRST CATEGORY: TECHNICAL AND SCIENTIFIC EDUCATION COURSES

Photogrammetry and remote sensing courses
- Fundamental Photogrammetry
- Remote sensing thematic applications
- Physics of remote sensing
- Photointerpretation
- Stereophotogrammetry
- Aerotriangulation
- Digital photogrammetry

Cartography and GIS courses
- Cartographic Projections
- Computer assisted drawing
- Cartography, Thematic Cartography
- Infography, printing technology
- Digital terrain model, GIS
- Spatial Analysis, database
FIRST CATEGORY: TECHNICAL AND SCIENTIFIC EDUCATION COURSES

**Cadastre & surveying courses**
- Fundamental surveying
- Surveying Procedures
- Management of cadastral Technics
- Digital surveying
- Road and art structure surveying

**Geodesy courses**
- Geometric Geodesy, Astronomy and Cosmography, adjustment Computation, spatial geodesy, GPS
- Price levelling, physical geodesy Metrolgy & control stability
- geophysics.

**Related Professional education**
- Consolidation, hydraulics,
- geomorphology,
- urban and rural management,
- roads techniques, sanitation,
- civil engineering techniques,
- Land and Real estate Expertise,
- Agricultural Water Management,

SECOND CATEGORY: MANAGEMENT COURSES

**Economy & Law courses**
- Micro Economics
- General Economics
- Professional Law
- Planning law
- Civil Law
- Land law

**Management education**
- cadastral management techniques,
- administrative organization,
- Accounting, Market State Budget and Public Finance
- Project Management,
- Business management & marketing
- planning cadastral information management,
- System of Quality Management

FIG WW MARRAKECH 2011  MAY 2011
THIRD CATEGORY: LANGUAGES AND COMMUNICATION SKILLS

French
- Communication skills in French
- Synthesis technics in French
- Writing texts in French

English
- Communication skills in English
- Synthesis technics in English
- Writing texts in English

CHARACTERISTICS OF THE PRACTICAL EDUCATION PROGRAM

- Field trainings
- Laboratories
- Seminars
- Studying visits
- Projects
- End of studies project

Practical Program 30%
FIELD TRAININGS OF THE ENGINEERING CYCLE

First year: cadastre training familiarize students with the work carried out by various departments.
- Cadastre Services in kingdom
- Land registration services in Kingdom
- 3 weeks

Second year: professionalization training practice concrete projects of Geodesy, surveying and photogrammetry.
- Triangulation, traverses, GPS, levelling surveying and stereo-preparation
- Coordination with the services of the national mapping agency and local communities.
- 5 weeks field + 3 weeks labo

Third year: Enterprise training prepare students for insertion into professional life.
- Semi-public or private sector
- Private surveying offices, urban agencies, the administration of highways, the Department of roads and road traffic
- 4 weeks

IMPACTS OF TRAININGS ON NATIONAL ECONOMIC DEVELOPMENT

- 29 New geodetic points
- 168 New traverse points for Cadastre use
- 29 new precise leveling control points
- Promote mountain tourism of three rural centers
- Sanitation works for two local communities
- Setting up water pipes
- Management of the streets
- Agricultural development
STUDYING VISITS

Objective: assist to the works realised within laboratories:
- Printing maps
- Digital mapping labo
- Photogrammetric restitution
- Archiving maps
- Dam buildings sites
- Highway building administration.
- Stability control of bridges
- Site Sanitation
PRACTICAL PROJECTS

- Projet of surveying
- Project cartography
- Photogrammetry
- GIS
- Database
- GPS
- Projet of geomatic
- Remote sensing
- Sanitation; Consolidation; Road project

SEMINARS

Collaboration ONIGT
- Ethics of the profession
- Problems related to the exercise of the profession (law 30/93)
- Marketing
- Habitats law
- Internet & GIS
- Expropriation
- Land expertise
- GPS permanent stations/GNSS
END OF STUDIES PROJECT

- Personal student full-time to study a topic or carry out a practical project in the fields of geomatics and surveying engineering.
- Topics identified and defined by professors in collaboration with partners in the sector.
- Writing a document that reflects bibliographic study of the theme studied, presentation and analysis of the results.
- Student must defend his work publicly in front of a jury (professors and professionals).
- Duration: last semester.

CONTINUING EDUCATION

The school gives importance to continuing education in order to:

- Follow the rapid technological evolution.
- Courses dedicated to meet the needs of the professionals.
- Themes carried out between 2006 and 2010:
  - Road projects, Arc GIS, remote sensing,
  - GPS for cartography, geodesy and surveying,
  - Satellite imagery, Covadis 2D & 3D,
  - Digital photogrammetry.
**RESEARCH**

Some aspects:
- **Up to 2005:** 7 graduate doctorats
- **2010:** Doctorate Research (2 Units)
- **24 demands, 8 accepted**
- **Specific research Conventions:**
  - cooperation agreement with the ANCFCC consists in:
    - continuing education
    - conduct research development programs
    - scientific activities

---

**INTERACTION BETWEEN THE EDUCATIONAL SYSTEM AND THE PROFESSION**

Two main partners
- National Agency for Land conservation, Cadastre and Cartography (ANCFCC)
- National Order of Surveying Engineers (ONIGT)

**Student sponsorship agreement with the ONIGT:**
- Coaching students during school and after their graduation.
- Student is sponsored by a private enterprise
- After graduation, the sponsored undertakes, working within the enterprise of the sponsor for a period
PARTNERS’ CONTRIBUTION IN THE EDUCATIONAL SYSTEM

Contribution: participation of professionals in the realization of some educational activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>VH %</th>
<th>Supervision</th>
<th>% part IGT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related professional courses</td>
<td>75%</td>
<td>Engineers from private and public</td>
<td>100%</td>
</tr>
<tr>
<td>Management courses</td>
<td>14%</td>
<td>IGT &amp; contractors</td>
<td>50%</td>
</tr>
<tr>
<td>Training in cadastre</td>
<td>3 weeks</td>
<td>ANCFCCC</td>
<td>100%</td>
</tr>
<tr>
<td>Enterprise training</td>
<td>4 weeks</td>
<td>Private Ing</td>
<td>100%</td>
</tr>
<tr>
<td>End studies project</td>
<td>16 weeks</td>
<td>IGT</td>
<td>30%</td>
</tr>
</tbody>
</table>

CONCLUSION

- The school of geomatic sciences and surveying engineering is the unique school surveying engineers in Morocco.
- The school’s staff is composed of professors that graduate from Canada, USA, Belgium and France.
- The school has a large and unique experience in the domain of education.
- Up to 2010, the school has formed more than 1000 engineers; around 5% of them are from Africa (Senegal, Burkina, Togo, Tunisia, benin…).
CONCLUSION: EMPLOYMENT MARKET

ANCFCC OFFICES

Private societies
Surveying private offices

Urban agencies
Territorial management
Habitats
Urbanism

Highways
Roads

Tourism
Public works

Agriculture
Municipalities

Public
Private

Entreprises
Private societies

CONCLUSION:

EMPLOYMENT MARKET

Thank you for your attention

FIG WW MARRAKECH 2011
MAI 2011

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

16