


**Assessment of Topography E-learning with Exomatic**




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**Content**



- Context of e-learning
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- Concept of Internet-assisted topography
- Exomatic
  - Architecture of the application
  - Example
  - Exomatic under GPL
- Assessment of Exomatic
  - Evaluation mode
  - Analysis
- Perspectives

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**Context of e-learning**

- **Definition**
  - E-Learning is an approach to **enhance learning** through computer using appropriate software and communication technology
  - Development of **web services**
    - More flexibility
    - Easy access to learning resources
  - Pedagogical means for enhancing the learning environment


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**Context of e-learning**

- **Integrative approach**
  - E-learning is introduced as a combination of **online** (web-based) and **face-to-face** teaching
  - Lectures and non-formal learning are equally important
  - Information-processing systems and collaborative tools represent a mandatory part of the instruction

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**Swiss Federal Institute of Technology - Lausanne**



6400 Students  
210 Faculty members (FTE)  
3200 Staff (FTE)

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**EPFL: Organisation**

Schools	Education programs	
Basic Sciences	Physics	Chemistry / Chemical Eng.
Engineering Sciences and Techniques	Mathematics	Material Sciences
Computer and Communication Sciences	Electrical Engineering	Microtechnology
Architecture, Civil and Environmental Eng.	Mechanical Engineering	Computer science
Life Sciences	Communication systems	Architecture
Social Sciences and Humanities	Civil Engineering	Environmental Science & Eng.
Management of Technology	Life Sciences & Technology	Management of Technology

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**EPFL**

## Topography courses @EPFL

- **Curriculum**
  - ENAC school: Programme in architecture, civil eng. and environmental eng.
  - Bachelor (3 years) & Master (2 years)
  - Geomatics: specialization of env. Eng.
  - Topography & GIS: common courses for civil & environmental eng.
  - 1st year: more than 150 students
  - Lectures + Exercises, few hands-on

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## Topography courses @EPFL

- **The way to e-learning**
  - To improve the lecture flexibility
  - To reduce # of contact hours
  - To create **personalized exercises**
  - E-learning in topography is a natural evolution not a revolution
    - Traditional lessons "face to face"
    - Online exercises **Exomatic**

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**EPFL**

## Concept of Internet-assisted topography lessons

- **Progressive introduction of e-learning in topography**
  - Lectures
  - Exomatic

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**EPFL**

## Exomatic: architecture

- **Objectives of Exomatic**
  - To **automate the production** and the marking of individualized exercises
  - To make the **management of the system easier** by teachers
  - To implement the concept with **standard languages** (PHP, Perl)
  - To create a **user-friendly interface**

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## Exomatic: architecture

- **Generating the exercise**
  1. Generate personalized data
  2. Integrate data into web pages
  3. Upload pages onto a web server

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**EPFL**

## Exomatic: architecture

- **Marking the exercise**
  4. Retrieve the student answers
  5. Mark the student answers
  6. Integrate the correct answer into a web page
  7. Upload the correct answers onto a web server
  8. Email obtained marks to students

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# Exomatic - Example

**Choose your name**

**Entry Page**

**Overview of the assignment**

**Questionnaire of the assignment**

**Help & formula**

**Help & formula**

**Form for the entry of result values**

EPFL Laboratoire de Topométrie

Cours de Topographie - Sections SE & GC 2<sup>e</sup> semestre

Exercice obligatoire n°2

Consultez la correction de votre exercice en sélectionnant votre nom dans le menu déroulant.

Voici les résultats que vous aurez dû trouver:

- Correction métrique pour A: 23.4 ppm
- Correction métrique pour B: 26.5 ppm
- La première décimale suffit amplement (topom = leveling)
- Distance oblique réduite métrique vers A: 818.979 m
- Distance oblique réduite métrique vers B: 721.709 m
- Différenciation analytique

Precision des mesures de température pour une correction métrique correcte à 1 ppm près

On peut calculer  $\frac{1}{\Delta T} = \frac{1}{273.15}$ . Pour  $\Delta T = 1$  ppm et nos valeurs de température et de pression, on en déduit que la température doit être mesurée à 1 degré près.

Precision des mesures de pression pour une correction métrique correcte à 1 ppm près

On peut calculer  $\frac{1}{\Delta P} = \frac{1}{1013.25}$ . Pour  $\Delta P = 1$  ppm et notre valeur de température, on en déduit que la pression doit être mesurée à 4 mbar près.

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## Exomatic under GPL

- GNU - General Public License
  - Use of open-source software (PHP, Perl)
  - To guarantee a coherent development of the project

<http://sourceforge.net/projects/exomatic>

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## Assessment of Exomatic

- Evaluation mode
  - Center for research and support of training and its technologies (CRAFT)
    - Evaluation of pedagogical methods
    - Set-up of a questionnaire
    - Assessment of the course content
    - Advice to the teacher
  - Useful information for the enhancement of the pedagogy at the EPFL

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## Assessment of Exomatic

- Evaluation criterions (1)
  1. Clarity of wording, description
  2. Clarity of topics
  3. Quality of online documents
  4. Coherence between course and exomatic
  5. Level of difficulty
  6. Usefulness of exomatics to apply the knowledge

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## Assessment of Exomatic

- Evaluation criterions (2)
  7. Quality of the supervision
  8. Communication with the teaching staff
  9. Means of monitoring the progress made by the students
  10. Verification of knowledge by self-correction
  11. In-depth training
  12. Monitoring system suited for the test of knowledge

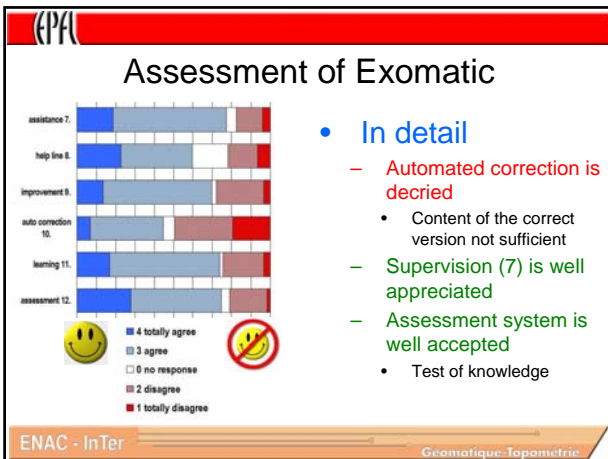
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## Assessment of Exomatic

Description	4 totally agree	3 agree	0 no response	2 disagree	1 totally disagree
description 1	~63%	~28%	~9%	~0%	~0%
topics 2	~63%	~28%	~9%	~0%	~0%
on-line doc 3	~63%	~28%	~9%	~0%	~0%
consistency 4	~63%	~28%	~9%	~0%	~0%
level of diff. 5	~63%	~28%	~9%	~0%	~0%
utility 6	~63%	~28%	~9%	~0%	~0%

- Global Analysis
  - 63% of students assess it as good
  - 28% as sufficient
  - Positive acceptance
- In detail
  - Uniformity of answers (~75% OK)
  - High percentage (25%) disagree with the coherency between course and exomatic

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- Assessment of Exomatic**
- Conclusions**
    - Exomatics have a **positive impact** on the organization of the course
    - Good balance** between theory and applied calculus
    - Time gain for answering questions and marking exercises
    - Introduction of exomatics in classroom is still necessary
      - To link exercises with theory
      - To ensure that the level of autonomy is good enough

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- Perspectives**
- Towards a full integration**
    - Use of a virtual learning environment
    - Moodle is implemented @ EPFL
      - <http://www.moodle.org>
      - To improve the course management
        - Mailing & communication
        - Security in assignments, Quiz
        - Grades
    - 2007: Implementation of Exomatic in Moodle

