

MUMIE

Online e-learning system for mathematics

E-learning and Mathematics (Eindhoven University of Technology)

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What is Mumie?

- E-learning platform specialized in mathematics
- System is supporting
 - the self study of students
 - the lecturing of concepts
- Distinctive features:
 - Interactive* visualization, training and exercises
 - Focus on exploring concepts
 - Summary of the Theory
 - Tree of Definitions, Theorems and Algorithms

What is Mumie?

Environment developed by mathematicians [TU Berlin]

- Platform independent
- LaTeX and Java based
- Authoring tools available
- Customizable maths output
- Multilingual
- Open source
- Good support from TU Berlin
- Growing community:
TU Berlin, Technische Universitat Munchen, KTH, TUD,
Georgia Institute of Technology



What is Mumie?

Demonstration

Distinction from other e-learning systems

- Focus on concepts and straightforward application of definitions and theorems. Where possible, Java applets for visualization.
- System gives an overview of definitions and theorems.
- In the TUD-implementation:
 - A relatively small set of exercises, based on the examples and applets as given for self study
 - No elaborated feedback on the exercises send in



Setting of the Mumie implementation at TUD
Linear Algebra Course
Faculty Aerospace Engineering (AE)


- \pm 520 students (first year)
- The study program at AE is densely packed with courses, lab sessions and projects
- Courses in Mathematics are for the students of “secondary” importance =>

self study & exercising: not in pace
underestimation of math. & conceptual complexities
preparation for the exam starts too late



The aims of Mumie in the TUD implementation

- Stimulate the students to study the Linear Algebra in time and to keep up with the lectures from the start.
- Let the students exercise with interactive visualizations for acquiring a quicker grasp of concepts and structure.
- At the end: a better preparation and a better result to the exam.



Implementation of Mumie

in the Linear Algebra Course
(Faculty of Aerospace Engineering)

- Supplementary to the lectures/tutorials (students exercise with Mumie at home).
- On voluntary basis.
- $\geq 60\%$ score on exercises (2 rounds) \Rightarrow 2 x 0.5 bonus.
- One of the Mumie exercises also on the exam.

Results from a survey (327 st. / 400-500)

- 80% have done almost all Mumie exercises
- 60% : Mumie (very) useful for understanding the Lin. Algebra
15% : not so
- 60% : the applets are illuminating; 15% : not so
- 75% : structure of the Mumie system is obvious (enough)
 - not always clear when exercise is definitely send in
- 85% : recommend Mumie positively as e-learning tool for the Linear Algebra course

Other data & results

- 402 students participated in Mumie (at least 1 or 2 rounds)
267: 1 bonus, 50: 0.5 bonus, 85: 0.0 bonus
- Exam
477 students (April 2011)
71%: pass the Linear Algebra exam
29%: fail
- 60% of the failing students: with 0.0 bonus or no Mumie
- 7% of the passing students: fail without the bonus

Next improvements of Mumie & Linear Algebra course

- Announcement of all the deadlines at the beginning of the course.
- Addition of content and applets, e.g.
Least Squares problems, Quadratic Forms (3D-applets?)
- Addition of exercises typical for the exam at the end of sections.
- A better overview for the students of the exercises which are definitely filled in.
- More Linear Algebra courses at TUD using Mumie?



In the longer future

Implementation of Mumie in other domains
(e.g. Mechanics, Electrical Engineering, Numerical Analysis)

in collaboration with other Technical Universities
(European project) ?



Try it yourself !

For more information: r.vankints@tudelft.nl

www.mumie-hosting.net/tu-delft

username: demo

password: demodelft

Documentation about the Mumie environment

www.mumie.net



Questions ?