



Vienna University of Technology

Teaching Models @ BIG

How to give 1000 students an understanding of the UML

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Outline

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Background

2006: curriculum change of computer science and business informatics at the Vienna University of Technology

- the *Object-Oriented Modelling* course (OOM, 3 ECTS) became mandatory for all students of those fields of studies
- we were suddenly confronted with organizing a course for about 1000 students
- old system with student tutors did not scale
 - ⇒ new strategy for efficiently handling the mass and keeping high quality standards at the same time



Team



Organization

- 3 parts:
 - lecture
 - lab
 - e-learning self-assessments
- administration platform: Tuwel
 - Moodle-based e-learning system customized by the TU Vienna
 - management of resources like slides, exercise sheets, test results
 - support via online forum
- recommended literature (in German):
 - M. Hitz, et al., UML@Work, dpunkt.verlag, 2005
 - C. Rupp et al., UML 2 glasklar, Hanser Fachbuchverlag, 2005



The Lecture (Schedule of Winter Term 2008)

- Wednesday, 12:00 – 14:00, given by Prof. Huemer
- oral presentation, discussion
- attendance is recommended but not mandatory

1	15.10.2008	introduction
2	22.10.2008	structural modelling, part 1
3	29.10.2008	structural modelling, part 2
4	05.11.2008	structural modelling, part 3
5	19.11.2008	sequence diagram
6	26.11.2008	state diagram
7	03.12.2008	activity diagram
8	10.12.2008	use case diagram



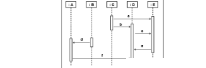
Lab

- 6 units covering the content of the lecture
- each unit covers one diagram type
- 6 exercises per unit
 - theoretical questions
 - practical modelling tasks
- groups of max. 50 students supervised by academic staff members
- students have to prepare at least 24 exercises to pass the course (out of 36)
 - teacher selects one student to present his/her solution to the group

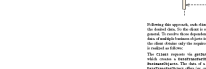
Figure 1: Petri Net Modeling Exercise 1: Response Diagram

Exercise 1: Theoretical Background
 Interpretation of the response diagram and answer the following questions.
 a) Draw the 3 places back of Exercise Diagram and describe them briefly in words (location and what they represent).
 b) Describe the possible reaction of a response diagram. What does it mean?
 c) What is a state transition? Can you give an example?
 d) What is a state, when is a system stable? Describe the difference.
 e) Describe the difference between a place and a transition in a response diagram.
 f) What types of transitions can you find in a response diagram? Describe the working principle.
 g) What is a state transition? Describe the working principle and to it the state of the system?
 h) Explain the operation of the group "Waiting and insertion".

Exercise 2: Diagram
 Use the given Petri Net Modeling (Figure 1) response diagram with the message (1,2).



Exercise 3: Exercise
 a) Use the Petri Net Modeling (Figure 1) response diagram with the message (1,2).
 b) Describe the operation of the group "Waiting and insertion".
 c) Describe the operation of the group "Waiting and insertion".
 d) Describe the operation of the group "Waiting and insertion".
 e) Describe the operation of the group "Waiting and insertion".



Exercise 4: Exercise
 a) Describe the operation of the group "Waiting and insertion".
 b) Describe the operation of the group "Waiting and insertion".
 c) Describe the operation of the group "Waiting and insertion".
 d) Describe the operation of the group "Waiting and insertion".
 e) Describe the operation of the group "Waiting and insertion".



E-Learning Support (1/2)

- self-assessments in the Tuwel course (voluntary)
 - self-testing of theoretical knowledge
 - exercises to practice modelling
 - similar questions as given in the tests
 - no impact on the grade
- we provide:
 - 82 multiple choice questions
 - 36 open modelling exercises
- in summer term 2008
 - 60% of the students used the multiple choice questions for test preparation,
 - only 30% used the other examples too



Grading

- 3 tests about the content of the lecture (theoretical questions) and about the content of the lab (practical exercises)
- 30 minutes per test
- one test (out of three) might be repeated at the end of the term
- a student passes the course if
 - (s)he solves at least 24 exercises for the lab
 - (s)he could present and explain the selected exercises conveniently
 - (s)he obtained at least 40 points on each test (out of 100 points)
 - (s)he totally obtained at least 150 points on the tests



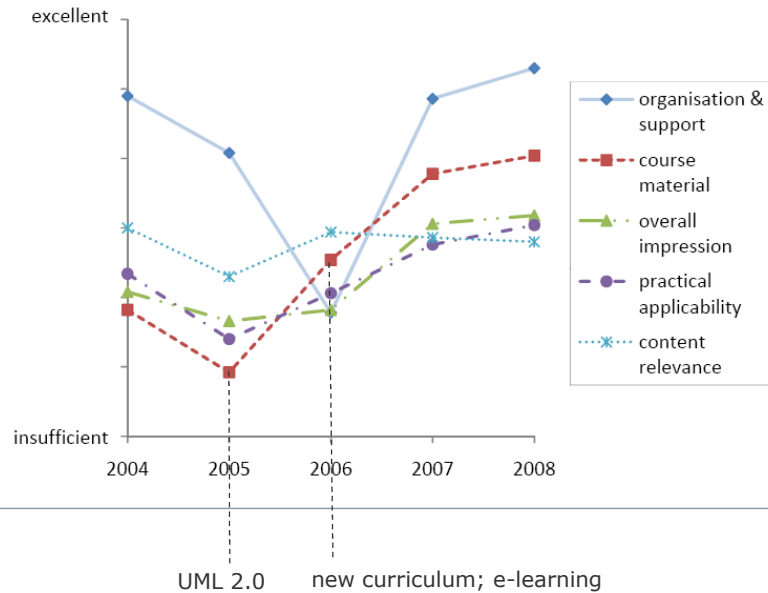
Effort for the Students

- OOM is a 2.0 VU -> 3.0 ECTS (75 hours):

lecture:	8 x 2.0h	16.0h
lab:	6 x 1.5h	9.0h
preparation of exercises:	6 x 6 x 0.75h	27.0h
tests:	3 x 0.5h	1.5h
preparation for tests:	3 x 7.0h	21.0h
remaining:	0.5h	0.5h
		<hr/>
		75h



Evaluation by Students



Our Experiences

- good scalability
- predictable effort
- many interesting discussions during the lab
- very positive reactions of the students
- students prefer 3 small tests instead of one big test
- many lessons learned in e-learning

Outlook

advanced course: *Model Engineering*

- attended by 150 master students per year
- content of the course:
 - metamodeling
 - model transformations
 - code generation
 - graphical modelling editors

- in the lab the students practically apply state-of-the-art frameworks

- this course finally closes the gap between programming courses and the modelling course