Experience of 3 Years Intensive Courses Software Engineering in Tirana

Klaus Bothe

Zoran Putnik

Main building of Polytechnic University Tirana ... and hotel Sheraton ☺

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Agenda

- **Overview of 3 years SE courses 2007 - 2009**
- Delivery of the course: lectures
- Assignments and Exams Organized at a Distance
- Students feedback: 2007 - 2009
- What really would be useful to be improved

Overview

- April 2006, DAAD conference at Ohrid lake:
  B. Cico and K. Bothe: first ideas

- 2007, 2008, 2009:

  Intensive courses SE (JCSE):
  1 week = 6 days of lectures in Tirana

  - followed by assignments and examinations via email
  - cooperation between Klaus Bothe and Zoran Putnik
    (selected lectures, assignments, exams)
  - ... and since 2008: guest lectures by assistants from Tirana

Overview: 66 students in 3 years

2007

2008

2009

19 – 24 March 2007	**21 – 26 April 2008**	**22 – 27 June 2009**
17 students	**32 students**	**17 students**
4th semester	**1st semester** (15) **3rd semester** (17)	**2nd semester** (11) **Master Tirana**
Master	**Master**	**6th semester** (6) **Bachelor Struga**

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6

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Photo from the lectures in 2009

Photo from the lectures in 2009

27.06.2009 09:40

Delivery of the course:
lectures, assignments, examinations

- **Lectures:** 22 – 27 June 2009, 6 days, 5 – 7 hours per day

- **Schedule** (agenda) delivered before → next slide

- **Handouts** before lectures: 48 important key slides

- **Printouts:** All slides published: <u>after</u> the lectures, as 1sided, 4sided pdf files

- **Assignments:** 1st before the course (Review of SemOrg); 2nd, 3rd, 4th each two weeks

- **Examinations:** September 2009 (Tirana only)

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Selected 19 topics for Tirana: Lecturers

in minutes	Z.B. (W 02)	K.B. (S 03)	
Part I: Introduction			
• 1 What is software engineering	80	120	K
• 2 Quality criteria ...	40	45	Z
• 3 Software process models	120	90	H
• 4 Basic concepts ...	60	40	K
Part II: Requirements engineering			
• 5 Results of the … phase	(70)	100	K
• 6 Cost estimation	60	100	Z
• 7 Function-oriented view	60	50	M
• 8 Data-oriented view	50	35	
• 9 Rule-oriented view	50	40	
• 10 Structured analysis	80	65	K
• 11 State-oriented view	(45)	80	K
• 12 Scenario-oriented view	30	25	Z
• 13 Object-oriented analysis	(60)	210	K
• 14 Formal software specification …	--	190	K

Part III: Software Design			
• 15 Overview of design activities	--	90	K
• 16 Structured design	--	15	K
• 17 Object-oriented design	--	45	Z
Part IV: Implementation and testing			
• 18. Implementation	--	90	
• 19. Systematic testing	--	180	K
• 20. Functional testing	--	150	Z
Part V: Advanced problems			
• 21 Software metrics	--	180	Z
• 22. Maintenance	--	-	
• 23. Reverse engineering	--	90	
• 24. Quality of software development …	--	90	
• 25. Software ergonomics	--	180	
• 26. User manuals	-	-	
• 27. Project management	?	90	
• 28. Configuration … management	-	45	

Z Zoran Putnik (6)   H Hergys Rexha (1) Sum: **33 lecture hours**

M Mihal Brumbulli (2)   K Klaus Bothe (10)   Selected topics 10

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Schedule (agenda) of the lectures

DAY 1 — 7 lecture hours a 45 minutes

Introduction: DAAD, JCSE, Tempus, concept of the course — 45

PART I Introduction to Software engineering — 6 lh

		Duration normal	planned
1 *	**What is Software engineering?** Motivation, Areas, Definition, History	100 90	90
2 *	**Quality criteria for software products** Classifications, definitions, ISO 9126	45 45	45 Z
3 *	**Software process models - introduction** Activities of software development, overview of models, Waterfall model, Prototyping (other models are introduced in various topics)	90 120	90 H
4 *	**Basic concepts and software development documents** Overview and cross analysis	40 60	45

DAY 2 — 6 lh

PART II Requirements engineering (analysis and definition)

		Duration normal	planned
5 *	Results of the „Analysis and Definition" phase Feasibility study, Product model, Requirement document	90 70	60
6 *	Cost estimation Costs, factors, function point analysis	90 60	60 Z
7 *	Basic concepts of the function-oriented view Function trees, Data flow diagrams	60 60	60 M
8 -	Basic concepts of data-oriented view data dictionary, Entity relationship	35 45	-
9 -	Basic concepts of rule-oriented view Rules, Decision tables and trees	45 50	-
10*	Structured analysis Context diagram, DFD-Hierarchy, Mini-specification, Implicit function tree	90 90	90

DAY 3 — 4 lh

11*	Basic concepts of state-oriented view Petri-Nets, State automata, Activity diagrams	90	60 M
12*	Basic concepts of scenario-based view Collaboration diagrams, Sequence diagrams	30	30 Z
13*	Object-Oriented analysis Class-diagrams, use-cases, UML, demonstration of a CASE Tool	90 +120	90

DAY 4 — 5 1/2 lh

14*	Formal software specifications and program verification Z, Algebraic, Hoare	130	130

PART III Design

15*	Overview of design activities Software architecture, Specification of components, Quality assurance, Overview of some software architectures		60
16*	Structured design Structure charts		15
17*	Object-oriented design Architecture design, user-interface, performances, implementation design		45 Z

DAY 5 — 5 lh

PART IV Implementation and Testing

18 -	Implementation Principles, methods, guidelines	60	-
19*	Systematic testing Classification, review/audit, control-flow, data-flow oriented	130	130
20*	Functional testing incl. testing tools	90	90 Z

DAY 6 — 5 lh

PART V Advanced problems — 22 lh

21*	Software metrics McCabe, Halstead, LOC, OO, CAME-Tools, Demo of MC-Tools	180	130 Z
22 -	Maintenance Types, requests, costs, planning		
23*	Reverse engineering Software repair, Reengineering, Restructuring, CARE-Tools	90	90
24	Quality of software development process and its standardization ISO 9000, Capability assessment models		
25	Introduction to software ergonomics Graphical user interfaces, Standards, Guidelines		
26	User manuals Principles and guidelines for writing user-manuals		
27	Project management Planning, organization, people management, control		
28	Configuration management Motivation, activities, CVS		

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Reminder of assignments:
2007 – 2009 the same ones in Tirana 🙁

- **Berlin: 8 assignments**
- **Novi Sad: 7 assignments**
- **Tirana: 4 assignments**

Assignments		HU	NS	TIR
1. Review requirements specification "SemOrg"		x	x	x
2. Function points	**(Tool)**	x	x	x
3. Review structured analysis model		x	x	-
4. Develop an OOA model	**Tool**	x	x	-
5. Formal specifications	**(Tool)**	x	x	x
6. Metrics	**Tool**	x	x	x
7. Select test cases functionally by the CTE	**Tool**	x	-	-
8. Select regression test cases by ATOS	**Tool**	x	-	-
9. Review of a assgn solution of another team		-	x	-

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Agenda

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Questionnaire results:

2007, 2008, 2009 (Tirana only)

selected questions

How do you consider the amount of knowledge offered in the lectures?

2007

4th semester

2008

1st and 3rd semester

2009
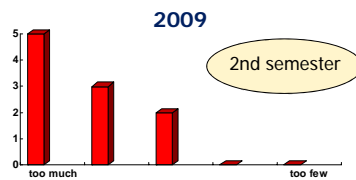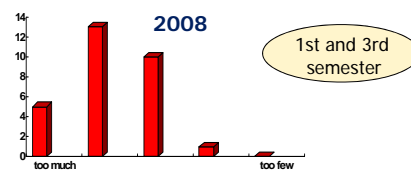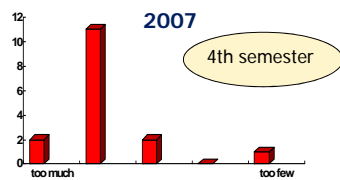
2nd semester

Tendency:
For higher semesters ok,
for lower semesters a challenge ☺
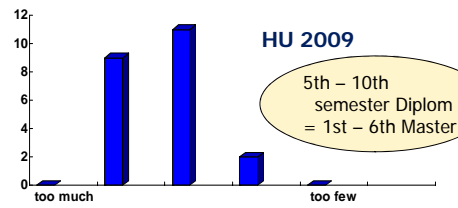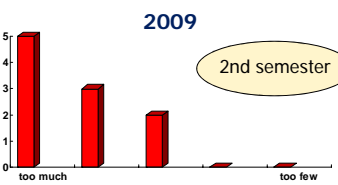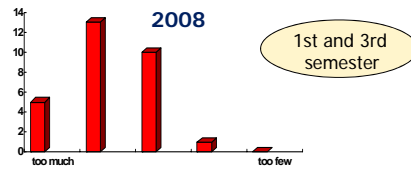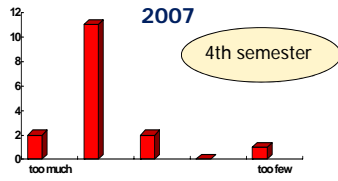
How do you consider the amount of knowledge offered in the lectures?

2007 — 4th semester

2008 — 1st and 3rd semester

2009 — 2nd semester

HU 2009 — 5th – 10th semester Diplom = 1st – 6th Master

17

How do you consider the amount of knowledge offered in the lectures?

2007 — 4th semester

2008 — 1st and 3rd semester

2009 — 2nd semester

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How do you consider the difficulty of the lectures?

2007

4th semester

2008

1st and 3rd semester

2009
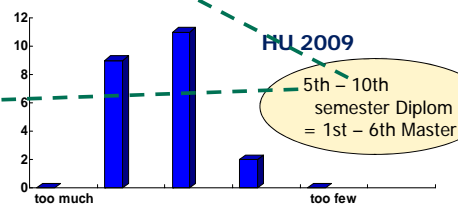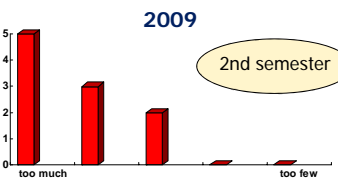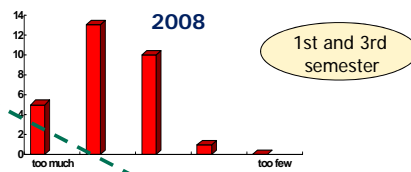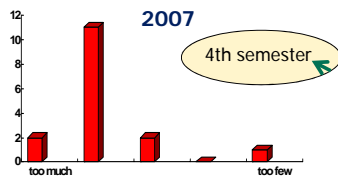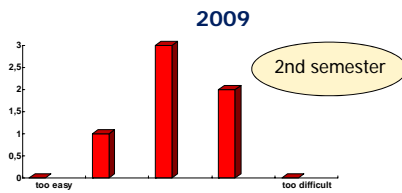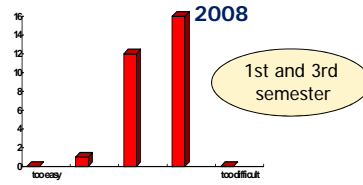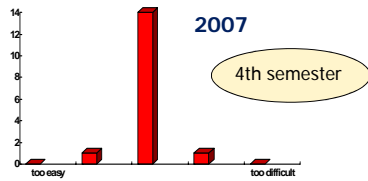
2nd semester

Tendency:
For higher semesters ok,
for lower semesters a slight challenge ☺

19

How do you consider the difficulty of the lectures?

2007

4th semester

2008

1st and 3rd semester

2009

2nd semester

HU 2009
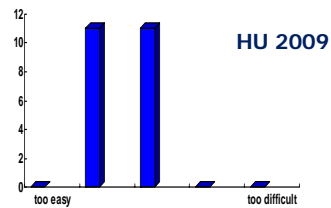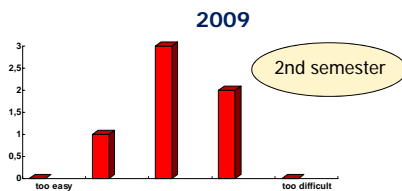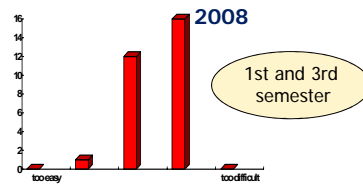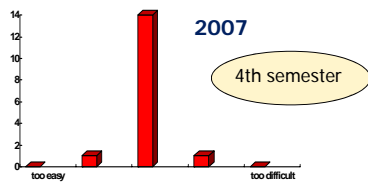
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Is the course well-structured?

2007

2008

2009
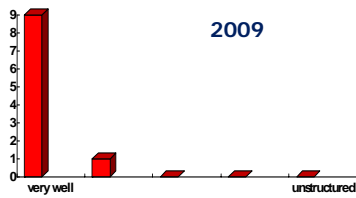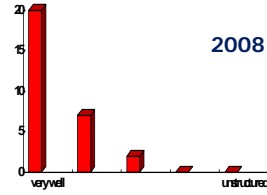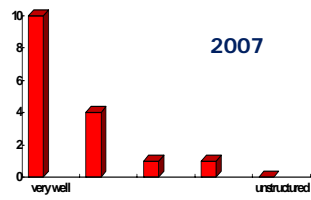
Tendency:
The course appears to lower semesters even more structured ☺

21

Is the course well-structured?
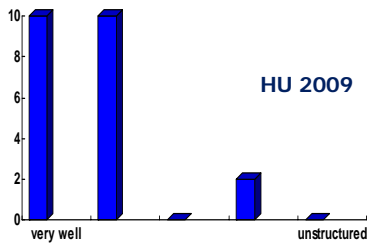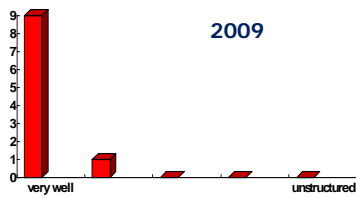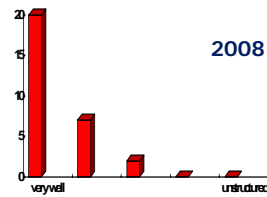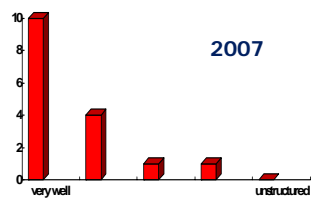
2007

2008

2009

HU 2009

22

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Are there any special requirements (pre-knowledge) to be able to understand the course?

2007

2008

2009
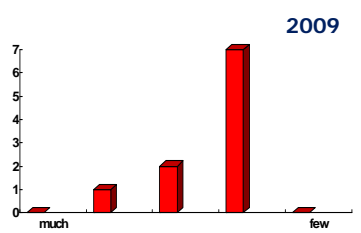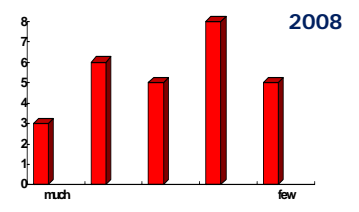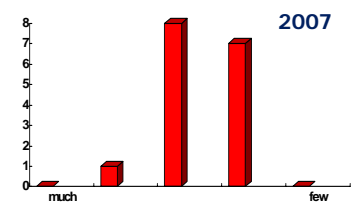
Conclusion:
Lower semesters do not have
problems with pre-knowledge

**Preknowledge:
programming languages,
Algebra, logics, UML**

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Are there any special requirements (pre-knowledge) to be able to understand the course?

2007

2008

2009

HU 2009

24

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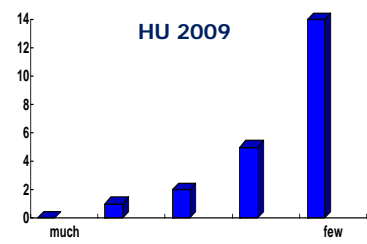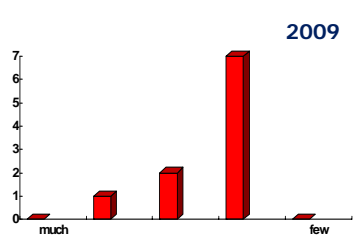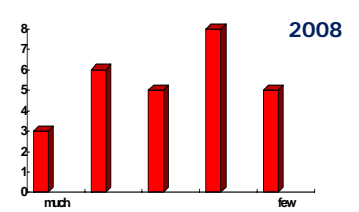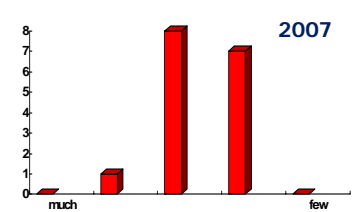
Was it a problem that slides and presentation were in English language?

2007

2008

2009
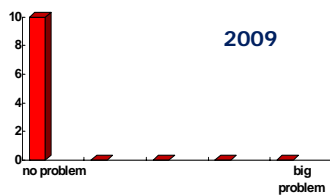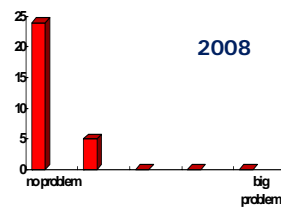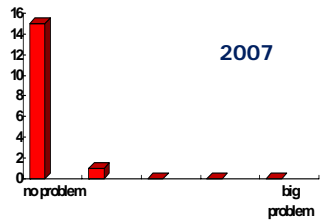
Conclusion:
English is not a problem

25

Was it a big problem to get the slides only after the lectures?

2007

2008

2009
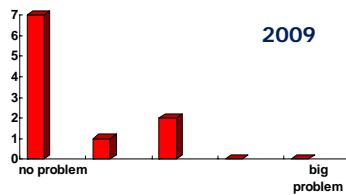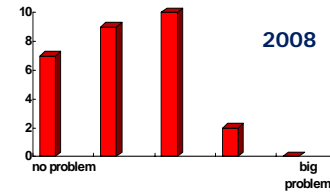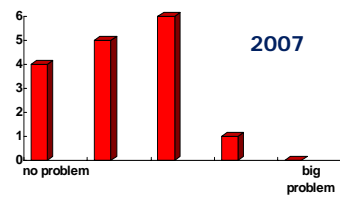
Conclusion:
Missing slides during lectures
are not a big problem
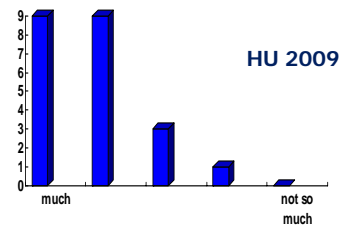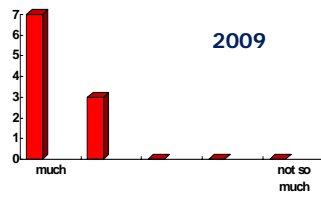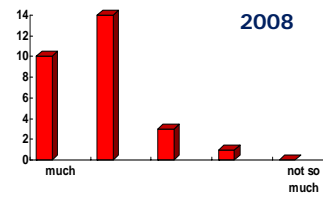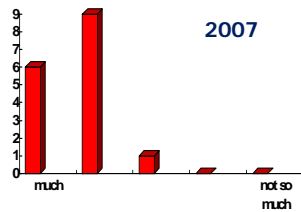
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Did you learn a lot of new things?

2007

2008

2009
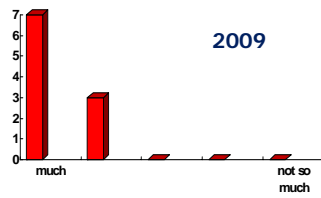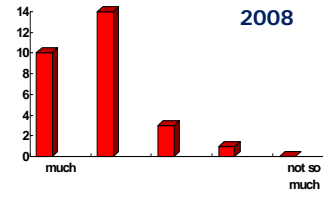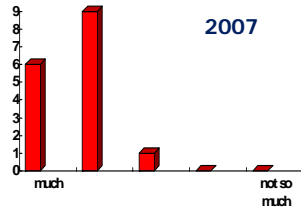
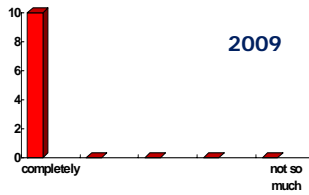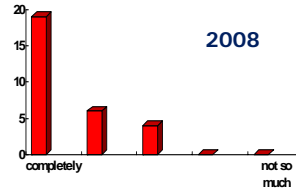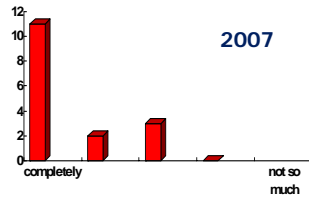Tendency:
Lower semesters learnt more
than higher semesters ☺

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Did you learn a lot of new things?

2007

2008

2009

HU 2009

28

Slide 29

Do you think the contents of the lecture is useful?
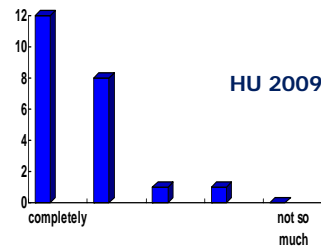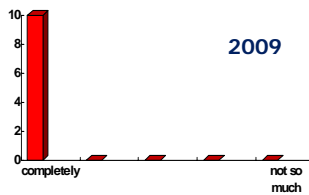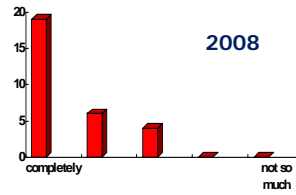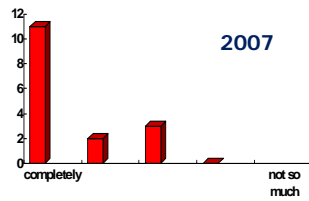
2007

2008

2009

Tendency:
Lower semesters believed more
than higher semesters that the
lecture contents is useful ☺

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Slide 30

Do you think the contents of the lecture is useful?

2007

2008

2009

HU 2009

30

What is your overall ranking of the lecture?

2007

2008
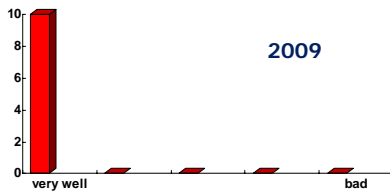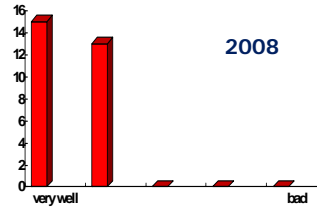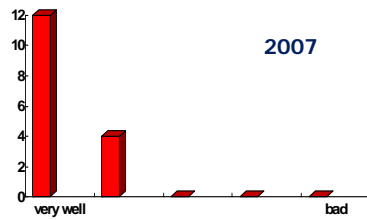
2009

Tendency:
Lower semesters ranked the lecture
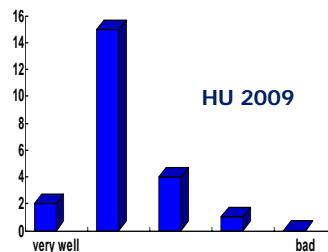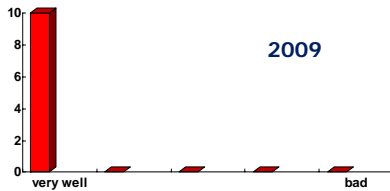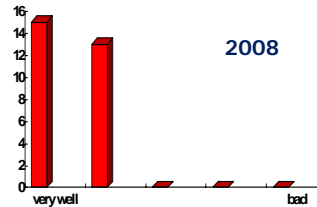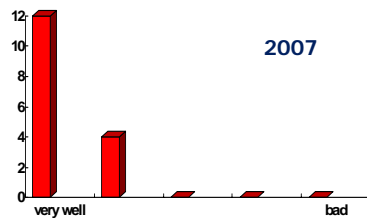better than higher semesters ☺

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What is your overall ranking of the lecture?

2007

2008

2009

HU 2009

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Students' comments 2009: general remarks

- At the end of the course, we got a good overview of SE
- I think we profit very much of this course
- The concepts of SE will be clear for us in the future
- I think I needed this knowledge
- A good basis for the whole study
- To have this course even earlier would help us to understand other fields better
- Lecturers were concerned to activate the students during the lessons

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Students comments 2009: worth preserving

What should be _preserved_ if the course will be presented the next time?

- All should be preserved – maybe something to be added
- My opinion about the course is: it is too good to be changed ☺
- The lecturers ☺
- The way of explaining
- It is Ok as it is.
- I liked the topics with interactions: questions - answers

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## Some students comments 2009: suggested changes

What should be <u>changed</u> if the course will be presented the next time?

- More interaction to keep students awake at a long day.
- Too much information on only 6 days. The course should last one additional week.
- My suggestion: not too intensive within a week
- Nothing.
- I would change nothing from that course
- Still more practical: e.g. using a tool in a laboratory
- More presentations to describe using SE at the real market
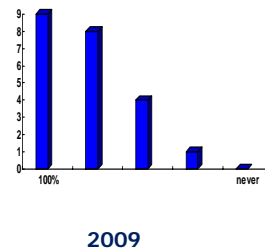- The lessons should be slower

35

How many lectures did you attend (percentage)
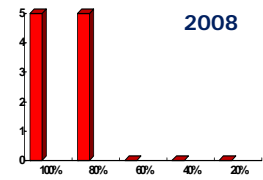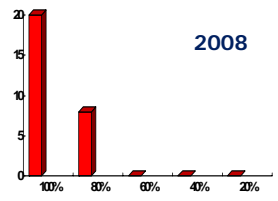
Tirana

2007

2008

HU Berlin

2009

2009
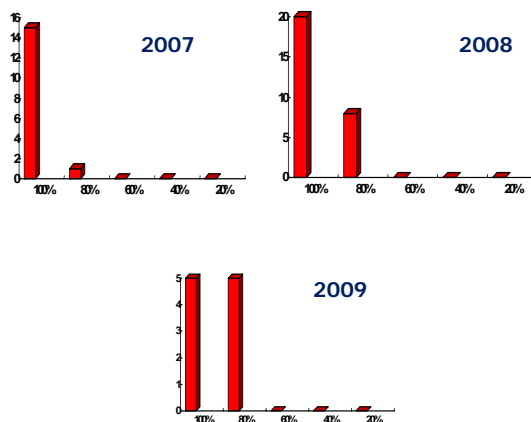
At HU: no obligation to attend the classes,
no name lists allowed due to data protection laws

36

How many lectures did you attend (percentage)

HU Berlin

Tirana

2007

2008

2009

2008

2009 estimated
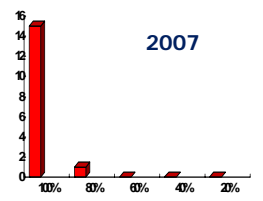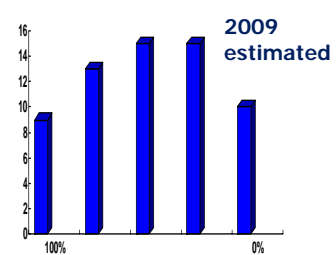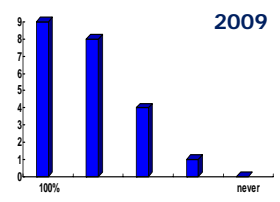
37

After the hard work: Group photo ☺ ...

After the hard work: ... and coffee in Sheraton Hotel

27.06.2009 12:57

Agenda

- Short history
- New aspects in 2008
- Delivery of the course: lectures
- Assignments and Exams Organized at a Distance
- Students feedback: 2007 - 2008
- What really would be useful to be improved

40

What really would be useful to be improved (1)

- More recent material:
  newspaper advertisement (1996, 1997, 2004, 2005),
  statistics from GI (1993), EU (1994)
- New topics, e.g. extreme programming
- Tool demonstration and usage:
  CTE, ATOS, UML tool, metrics tool

41

What really would be useful to be improved (2)

- Not only 6 days of lectures
- Longer breaks
- Not the same assignments
- Examination: too many too small questions because of
  the distance mode (all answers to be typed in a file and
  send to the examiners)

42

Thank you

New lecturers from UPT Tirana

- Plan: Tirana's own staff will take over the lectures
- Mihal Brumbulli, Hergy Rexha, and Fisnik Kraja:
  new lecturers in 2008 and 2009 were students in 2007/08
- Took over
  - topic 3 (Process models),
  - topic 7 (function-oriented view: use case, data flow ...,),
  - topic 11 (state-oriented view (state automata ...)
- Assessment of their lectures - did it very well:
  - their first lectures
  - use of slides produced by others
  - English slides, English as presentation language
- Faster than usual:
  Topic 3 usually 90-120 minutes, now: 55 minutes
- Proves: material convenient for reuse by lecturers which
  are not the developers

45

Feedback from students ("Questionnaire")

Our *standard feedback* form with *additional questions*:

- Was it a big problem that the slides and presentations were in English?

- Have the handout materials been sufficient to follow the lecture?

- Was it a big problem to get the slides only after the lectures?

+ Some *additional questions with open (free) answers*:

- What should be remained next time?

- What should be changed next time?

Assignments not included (after that week)   46

Development of teaching materials from 2007 - 2009

- Slides: only minor extensions and some elimination of misspellings
- Same assignments: not such a big problem since the solutions are rather individual and students need them as a repetition of lectures and preparation of exams
- New examination questions necessary.

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Reasons for selecting just these four assignments for Tirana

- Importance and actuality.

- (Non)-Availability of tools

- No local assistant available

- Ease of correcting at a distance

- Only four:
  - available time of students at the end of the semester,
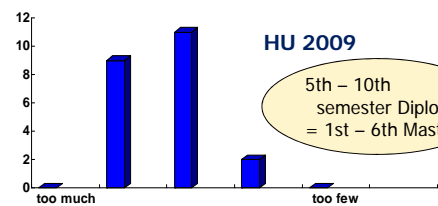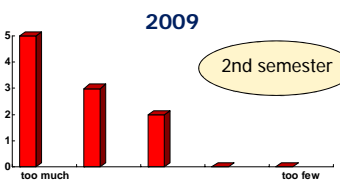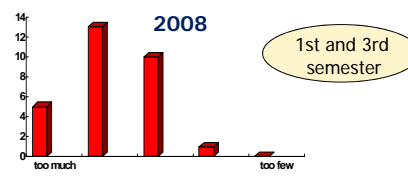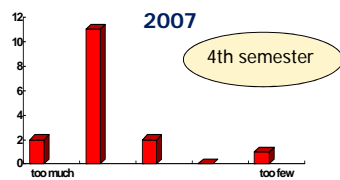 - available time of the reviewers: Bothe, Putnik

48

Assignments

- The first assignment was given to students *before* the course started.

- The most important reason was acquaintance with the main case-study, that is used throughout the whole course.

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How do you consider the amount of knowledge offered in the lectures?

2007

4th semester

too much — too few

2008

1st and 3rd semester

too much — too few

2009

2nd semester

too much — too few

HU 2009

5th – 10th semester Diplom = 1st – 6th Master

too much — too few

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