Stabilitätspakt für Südosteuropa
Gefördert durch Deutschland
Stability Pact for South Eastern Europe
Sponsored by Germany

Mixing JCSE topics with Sommerville at Sarajevo

Klaus Bothe
Novica Nosović

12th Workshop "Software Engineering Education and Reverse Engineering"
Opatija, Croatia, 3rd - 8th September 2012

Contents

JCSE: Applications in real lectures

- *Novi Sad:*
  2002-04: 2 times, English slides, 10 participants from industry,
  2003-05: graduate students, 12 students in average per year
  2004-12: undergraduate students, 65 students an average per year
- *Skopje:* English, 2 different courses since 2004
- *Plovdiv:* Bulgarian, 2 different curricula, 100 participants, since 2003, textbook in 2006
- *Kragujevac:* Serbian
- *Zagreb* (Dubrovnik): Croatian, 1 topic
- *Timisoara:* Romanian, 1 topic
- *Berlin:* 4 times (transparencies) + 8 times (ppt), German, 80 participants
- *Belgrade* (Faculty Elec.Eng.): 2005, 2006, Serbian slides, 12 topics, 133 participants in 2005
- *Rijeka:* since 2009
- *University of Tirana*: 2007 (short version: 12 lh)
- *Polytechnic University Tirana*: 2007 – 2012, master studies, intensive course
- **Sarajevo: 2012, mixed course (4 topics JCSE + 8 topics Sommerville)**

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JCSE: Application at Sarajevo – module data

- Sarajevo: 2012, mixed course "Software Engineering"
  4 topics JCSE + 8 topics Sommerville
  delivered by guest lecturing (Klaus Bothe)
  and local lecturing (Novica Nosovic)

Module "Software Engineering"

- University of Sarajevo, Faculty of Electrical Engineering, Department Computing and Informatics
- Bachelor
- Semester 6
- Module type: mandatory
- ECTS 5
- Workload 60 hours
- Lectures 35 (3 * 45 minutes per week, 12 weeks)
- Exercises 25
- Summer semester (20 February – 25 May 2012)

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Questions: JCSE application at Sarajevo

- Sarajevo: 2012, mixed course "Software Engineering"
  4 topics JCSE + 8 topics Sommerville
  delivered by guest lecturing (Klaus Bothe)
  and local lecturing (Novica Nosovic)

Questions:

- Is it possible at all to combine two rather different sources into one course?
- If there is one source – Sommerville - as the basis, why at all to include another one - JCSE?
- What is the experience?

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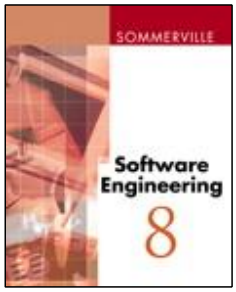
SE at Sarajevo 2011: based on Sommerville 8



Contents:
1. Introduction to SW and SE
2. Socio-technical Systems
3. Software Processes
4. Project management
5. Configuration management
6. Software Requirements
7. System models
8. Architectural Design
9. Object-oriented Design
10. Rapid software development
11. Software Reuse
12. Software testing
13. Security Engineering
14. Aspect-oriented Software Development

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SE at Sarajevo 2012: JCSE + Sommerville 9

Contents:
1. Introduction
2. Software processes
3. Requirements engineering
4. Agile software development
5. System modeling
6. Architectural design
7. Design and implementation
8. Software testing:
   Introduction and functional testing
9. Software testing:
   Structure-oriented testing
10. Software evolution
11. SW project management
12. Version control

DAAD

JCSE

Joint
Course on
Software
Engineering

SE at Sarajevo 2012: JCSE + Sommerville 9

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DAAD

JCSE

Joint
Course on
Software
Engineering

- Possible at all to combine two different sources into one course?
  YES

Software Engineering
University of Sarajevo in 2012

21 and 22 February 2012

1. Introduction
2. Software processes

Bothe: JCSE

Each topic: 3 * 45 minutes

Humboldt University:
Winter semester ending 17 February

3. Requirements engineering
4. Agile software development
5. System modeling

Nosovic: Sommerville

6. Architectural design

24 and 25 April 2012

7. Design and implementation
8. Software testing: Introduction and functional testing
9. Software testing: Structure-oriented testing

Bothe: JCSE

10. Software evolution
11. SW project management

Nosovic: Sommerville

12. Version control

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Sommerville as the basis

Sommerville:

- Internationally widespread textbook
- 9 editions
- Updated and extended in each version
- Website with course material

- Hard to teach (*my personal opinion*):
  - more top-level knowledge
  - does not go into depth

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JCSE as the basis

JCSE

DAAD

Joint
Course on
Software
Engineering

JCSE:

- Result of discussion and joint development (of different groups)
- Practical case study used in lectures and assignments
- Goes into depth in many topics (requirements, OOA, testing, metrics)
- Comprehensive teaching materials: slides, assignments, exams, case studies …
- Motivating didactical material (pictures …)
- Interactivity: questions to students included in lecture slides

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- Disdavantage: only German textbook (+ Bulgarian)

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Why at all JCSE at Sarajevo – in addition to Sommerville ?

- New aspects in a Sommerville-based course
- Detailed treatment of some important topics: software processes, testing
- Use of advantages of JCSE
- New experience with the JCSE
- Discussion with colleagues at Sarajevo
- Guest lecturing for local students

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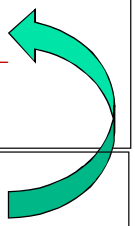

JCSE:
- Result of discussion and improvement (of different groups)
- Practical case study used in lectures and assignments
- Goes into depth in many topics (requirements, OOA, testing, metrics)
- Comprehensive teaching materials: slides, assignments, exams, case studies …
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- Interactivity: …

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JCSE: adaptation and extension of materials

1. Introduction
2. Software processes

Bothe: JCSE

3. Requirements engineering
4. Agile software development
5. System modeling
6. Architectural design
7. Design and implementation
8. Software testing: Introduction and functional testing
9. Software testing: Structure-oriented testing

Bothe: JCSE

10. Software evolution
11. SW project management
12. Version control

Not: take the JCSE materials and use them

JCSE: adaptation and extension of materials for Sarajevo

1. Introduction
2. Software processes

Bothe: JCSE

- Refreshment of JCSE: „Old" materials exchanged
- Dedicated material for students of Sarajevo (e.g. Top 10 job killers in software engineering)

Examples follow

Not: take the JCSE materials and use them

Extension + update of JCSE

Topic 1: Introduction
… and motivation

ICSE 2010, 2011, 2013

DAAD project „Joint Course on Software Engineering“ © 19

Job offer from BOSCH, Stuttgart 19 May 2011

http://www.it-jobs.stepstone.de/

Ihre Aufgabe:

- Entwurf und Realisierung von Anwendungsfunktionen eines Batteriesteuergerätes
- Verfeinerung und der Funktionsmodelle der Anwendungsfunktionen
- Optimierung der Funktionsmodelle für die automatisch Codegenerierung und/oder Umsetzung der Funktionsmodelle in C
- Mitarbeit bei der Definition von Testfällen für die Funktionsmodule
- Durchführen von Modultest für die Funktionsmodule
- Durchführen von Reviews

Your profile

Ihr Profil:

- Hochschulabschluss in Technischer Informatik, Informatik o.ä.
- 2-3 jährige Erfahrung in der Serienentwicklung von SG-Software im Automotive-Umfeld,
- Sehr gute Kenntnisse im Umgang mit MatLab/Simulink,
- Sehr gute Kenntnisse in der Programmiersprache C sowie im SW-Engineering,
- Sehr gute Kenntnisse in Steuergeräte- und Embedded-Software-Architekturen,
- Fundierte Erfahrungen im Umgang SW-Entwicklungswerkzeugen (z.B. DOORS, KM-Tools),
- Selbstständiges und zielorientiertes Arbeiten, sowie Belastbarkeit, Initiative und Teamfähigkeit.
- Sehr gute englische Sprachkenntnisse.

Job offer from BOSCH, Stuttgart 19 May 2011

http://www.it-jobs.stepstone.de/

Software Engineering for

Bosnia and Herzegovina … ?

… and for Albania, Croatia and … other countries at the Balkan?

Points of discussion?

Software engineering might NOT be useful for BiH because …

- … it is useful only for the construction of large software
- … it will be applicable only in big countries where large-scale software is being constructed
- … the software constructed in BiH is not safety-critical (errors are not so serious)
- … normally, software is taken and adapted in BiH, but not constructed
- … software construction is not a big part of economy in BiH

Good reasons?

Software engineering might be useful ALSO for BiH because …

- Outsourcing (Example): EU companies delegate software projects to other countries (e.g. Balkan) …
- All kinds of software projects – even smaller ones - need principles of software engineering (e.g. sound software architectures, systematic testing)
- ICSE 2012: "A sustainable world needs more software than ever…"
- „Top Ten Idea Killers in Software Development" (IEEE, Oct. 2011)

10 reasons not to be better in software development

10. "*This is good enough*" in Albania and BiH ☺ : "The fact is that *nothing is ever good enough, least of all software.*"

***9. "This is how it was always done*: This is an anachronism in any competitive, rapidly changing field but particularly in software."**

3. "*No one is asking for it:* Human beings are incredibly adaptable -- they will live with anything"

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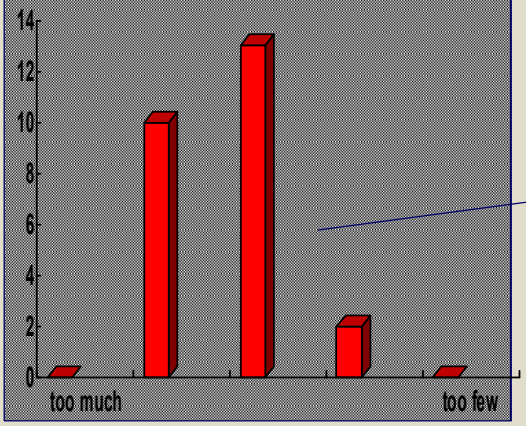
Feedback from students (questionnaire)

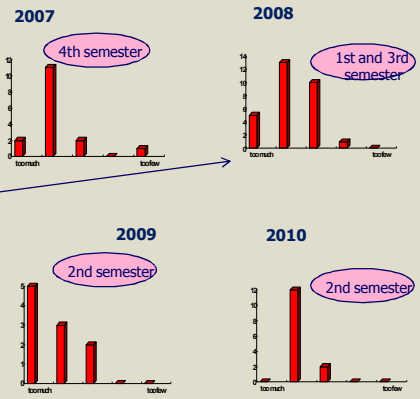
Only some examples

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

Sarajevo 2012:
4 lectures, Bachelor

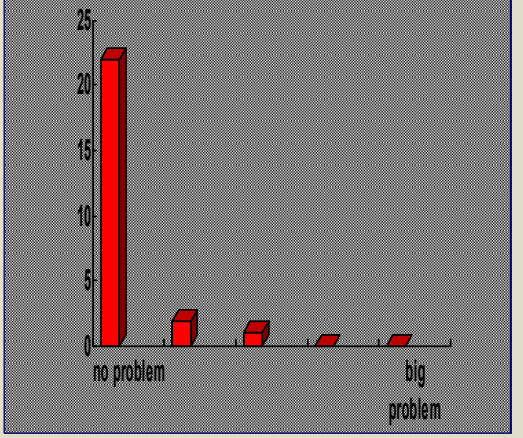


Tirana 2007 - 2010:
whole course, Master



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

Sarajevo 2012:
4 lectures, Bachelor



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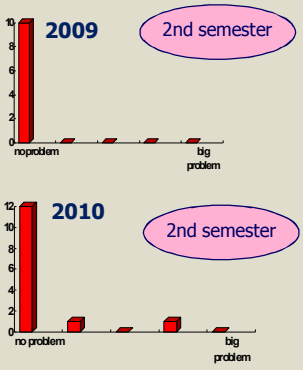
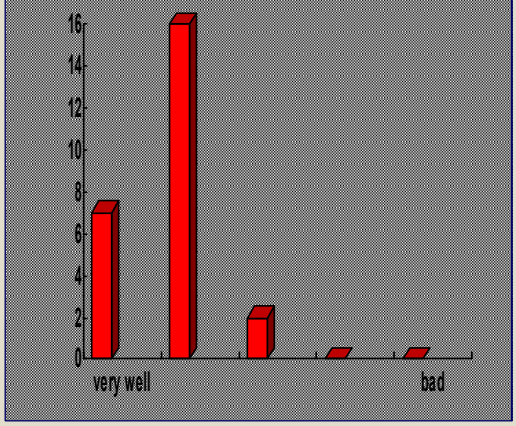


What is your overall ranking of the lecture?

Sarajevo 2012:
4 lectures, Bachelor



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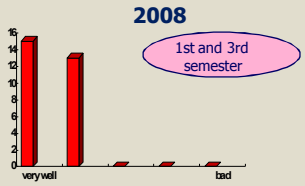

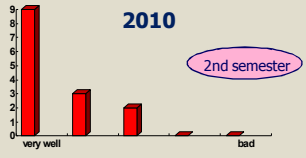

Textual remarks from students:

What should be changed the next time:

- Testing tools should be demonstrated
- Real-life examples (car industry) were very interesting
- More practical examples
- Nothing should be changed
- Keep it as this year

Our projects at the University of Sarajevo should include more testing activities.

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Testing as part of the exam

- Structure-oriented testing

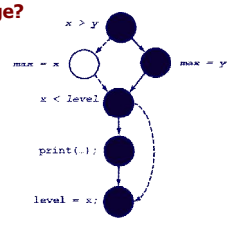
```
if (x > y)
    max = x;
else
    max = y;
if (x  < level)
    print();
level = x;
```

Test cases:

variable input	x	y	level
1st testcase	1	50	100
2nd testcase	50	51	52

Branch coverage?

Control flow graph?



- Comparison: Functional and structured testing
  - How are the test cases created during functional testing ("black box")?
  - Which are the advantages and disadvantages connected with functional testing?
  - Which is the practical approach of using white box and black box testing in practice?
  - ….

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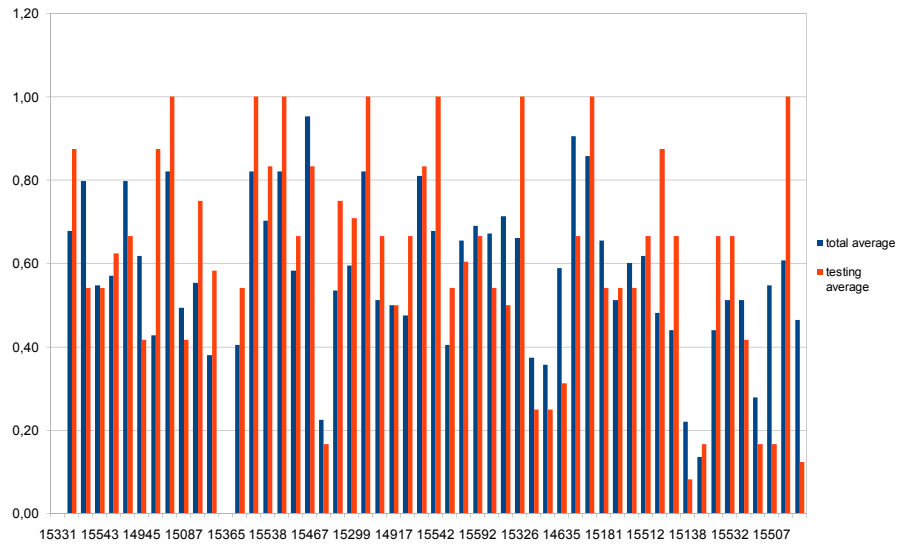
Statistics of exams: general vs. testing
„Testing lesson fitted perfectly!“ (Novica)



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Summary

- Students were interested and co-operative
- Fruitful interactions between lecturer and students
- JCSE – contributed to some deeper insight into selected topics
- Testing not in the focus of the project at Sarajevo (application of learning contents would be interesting)
- Positive „experiment" of JCSE application

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Pictures

Sarajevo February 21 2012

Sarajevo April 24 2012

Sarajevo 2012: Olympic bob run from 1984

Thank you

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