Five years of a SE course at HU: experience, conclusions, didactic principles

Klaus Bothe

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1. Changing course contents

● new subjects:
  refactoring, extreme programming,
  cleanroom software engineering ...

● subjects move to basic studies:
  (e. g. to 1st semester)
  - principles of object orientation:
    classes, inheritance, class diagrams ...
  - style guides:
    naming conventions, layout of programs ...

  reason: Modula-2 → Java
Software Engineering Course: Contents?

- Theses: Each course in a computer science curriculum has to do with SE

- Theses: SE principles should be taught from the very beginning

1st semester:
- Java and OOP

3rd semester:
- Compiler construction
- (SW project)

Advanced studies:
- SE course
- OOA & AAD: UML
- Formal methods
- SDL
- SW testing
- Data base

- Theses: There may be an overview course on SE which should be detailed in separate courses
2. Which textbook is suitable?

**Sommerville** (6th edition)

**Pressman** (5th edition)
- internationally recognized textbooks
- rather textual
- long tradition: fixed to traditional structures
- recommended as secondary literature

**Braude:** Software Engineering - an object-oriented perspective
- first version in 2001
- more modern perspective
- problems: not an ideal textbook
  (figures, exercises, still too textual ...)
- suitable secondary literature
(2. Which textbook is suitable? - cont.)

Balzert:

● disadvantage: in German ...

● ideal textbook:
  - a lot of excellent pictures
  - ppt slides available
  - a useful case study throughout the book:
    requirements document, cost estimation, OOA model, Structured Analysis Model
  - very systematic: classification of concepts
    (basic concepts)
  - very comprehensive (all important subfields covered)
  - exercises with answers
  - up-to-date

→ our way in project:
  English slides
  + secondary reading
  + remarks for the instructor
3. Motivation is an integral part of the course

student’s view:
  software development is equal to programming

SE:
  software development is much more than programming

→ topic 1 (chapter 1): give motivation
  each chapter is accompanied with motivation
  (e. g. examples from practice ...)
4. Interactivity as an element of better comprehension

- interactive lectures:
  
  dialogue with students,
  tutorial character
  pose questions to the students
  do not present complete or definitive solutions

SE means:
  
  the subject is in move / development,
  the answers to problems are nor unique,
  software development depends also on subjectivity,

  → discuss with the students advantages and disadvantages of techniques, methods, tools ... 

  → our slides will reflect this interactivity:
    questions included ...
    ... and answers too
    (problem: reuse of presentation over the years: answers become known)
6. On the organization of assignments (exercises)

- SE without exercises is frustrating.
- The best SE exercise is a project.
- Educational project management takes too much time.

Examples of exercises:

- Review of requirement documents
  (to learn about such a document,
  to work in groups assessing documents)

- Apply function point method to a given requirements document (cost estimation)

- Derive UML class diagram from requ. documents

- Apply tools, e. g.
  Mc Cabe: calculate metrics for a given C++ program

- Determine test cases for a problem (cte tool)
7. On the role of case studies: projects

- Understanding the necessity of SE principles deeply requires real projects

- SE course: 2 case studies
  - commercial (book) example
    (provider for extension studies / training)
  - technical system: use case of XCTL
    -> review documents
    -> derive UML class diagram
    -> determine test cases
8. Tools

- Together: OOA-OOD (UML)
- McCabe Tool:
  metrics, reengineering, analysis of SW
- Tessy, cte:
  test system (test case determination)
  (DaimlerChrysler)
- Microsoft project
- cvs: version management (XCTL project)
10. Guests: the view of practice

- **Test methodology and Test tools**
  (J. Wegener, R. Pitschinetz, DaimlerChrysler)

- **Formal software specification with Z**
  (A. Fett, DaimlerChrysler):