Programming Competitions as a Basis for an Algorithms and Data Structures Course

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Outline

I. Course Overview
II. Assessment
III. Curriculum Ideas
IV. Discussion

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I. Course Overview

- http://www.informatik.uni-leipzig.de/~paxton/algorithmics

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Background

- Practical Applications of Data Structures and Algorithms
- The University of Leipzig
- Winter Semester 2006 / 2007
- 75 upper division students
- 4 credit, elective course

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Funding

- Fulbright Award
- Montana State sabbatical

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Course Goals

- Improve problem solving abilities
- Improve (Java) programming skills
- Improve technical English abilities

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Course Format

- 90 minute lecture
- 90 minute lab
- Weekly exercise (30%)
- Local programming contest (10%)
- Final exam (60%)

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Local Programming Contest

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Course Topics

- Simple Input / Output
- Base Conversions
- Large Numbers
- Combinatorics
- Strings
- Sorting

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Course Topics

- Grids
- Trees
- Graphs
- Dynamic Programming
- Artificial Intelligence

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II. Assessment

- Student
- Instructor

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Student Assessment

1. The course took a practical approach to problem solving. How did you like this approach?

0 – strongly dislike
1 – dislike
0 – neutral
12 – like
8 – strongly like

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Student Assessment

2. The majority of the lecture time was spent coding solutions to problems. How valuable was this technique?

2 – not valuable
5 – somewhat valuable
10 – valuable
4 – very valuable

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Student Assessment

3. How much did your problem solving skills improve during the course?

0 – none
5 – a little
9 – some
7 – a lot

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Student Assessment

4. How much did your programming abilities improve during the course?

0 – none
7 – a little
11 – some
3 – a lot

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Instructor Assessment

- Emphasize testing more
- Post alternate solutions
- Use a grading script
- Have students take final individually (pairs underperformed by 12.5%)
- Have students code in class
- Improve the assessment process

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III. Curriculum Ideas

- Problem solving course
- Programming contest course
- Study abroad course
- Integrate into existing courses (CS I, CS II, artificial intelligence, networks, etc.)

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IV. Discussion

- How to avoid a “hack-fest”
- Managing 75 students with no TA
- A peek at the website

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IV. Discussion

- Thank you!
- Any questions?

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