



First release of the Joint Course in Software Engineering in English

Katerina Zdravkova, Boro Jakimovski
Faculty of Computer Science and Engineering, Skopje, Macedonia

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



English class at FINKI

- Since 2013/14, Faculty of Computer Sciences and Engineering (in Macedonian, FINKI) has a specialized class in English
- The only direction offered to English class is Computer Science and Engineering direction
- Enrolment:
 - 2013/14, 48 / 670 students (only one foreign student)
 - 2014/15, 50 / 750 students (no foreign students)
 - 2015/16, until now, more than 40 students out of 610, no foreigners so far

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Which courses are delivered in English?

- All the compulsory courses, unless there are less than 5 students eligible to enroll them
- Those elective courses with more than 5 students for which the teacher is ready to deliver the course in English
- Software Engineering is a compulsory course for Computer Science direction in the fourth semester

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Software Engineering at FINKI

- Since 2014/15, three courses in software engineering are held at FINKI:
 - Two inherited from former studies
 - From Institute of Informatics (JCSE)
 - From Faculty of Electrical Engineering (further MSEC)
 - First release of JCSE in English

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

Distribution of students

- ▶ Four groups / two different courses:
 - ▶ Course in Macedonian:
 - ▶ 95 students (lecturers: Gjorgjevikj and Madzharov)
 - ▶ 85 students (lecturer: Madzharov)
 - ▶ Bilingual JCSE (slides in Macedonian, lectures in English)
 - ▶ 210 students (lecturers: Zdravkova and Jakimovski)
 - ▶ **JCSE in English**
 - ▶ **22 students (lecturers: Zdravkova and Jakimovski)**

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

How much do JCSE and MSEC differ?

- ▶ Most of the topics are the same
- ▶ All the courses recommend the same basic literature (Pressman and Somerville)
- ▶ The slides are quite different (JCSE has its own sexy slides 😊)
- ▶ The order of the topics is sometimes different
 - ▶ For example, Quality Criteria is in the beginning of JCSE and before Quality Assurance in MSEC
- ▶ Assignments at both courses are different

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

What do we teach in our local JCSE?

- A very slightly modified version of JCSE, which emphasizes the object-oriented analysis, design and architecture
- The slides dedicated to structured analysis, design and architecture are optional
- Since last academic year, the case study which is the basis for the assignments is an object-oriented real-life project

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

Part of JCSE course this academic year

The screenshot shows a Moodle course page with the following content:

- Course:** Содержание Ииже... (Course ID: 741)
- Navigation:** Backup, Restore, Import, Reset, Question bank, My profile settings.
- 23 февруари - 1 март**
 - Topic 3a: Agile development
 - Topic 5: Results of the "Analysis and Definition" phase (1 s/p)
- 2 март - 8 март**
 - Topic 6: Cost Estimation (1 s/p)
 - Topic 7: Modelling and product models (1 s/p)
 - Topic 8: Basic Concepts Functional View (1 s/p)
- 9 март - 15 март**
 - Topic 9: Basic Concepts Data View (1 s/p) OPTIONAL
 - Topic 10: Basic Concepts of Rule Oriented View (1 s/p) OPTIONAL
 - Topic 11: Structured Analysis (1 s/p) OPTIONAL
 - Topic 12: Basic Concepts of State Oriented View (1 s/p)
 - Topic 12.5: Object oriented views (1 s/p)

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Lectures hours this year

- Students attending the course in Macedonian:
 - Monday 10 – 12 (usually Boro)
 - Tuesday 8 – 10 (usually Keti)
- Students attending the course in English:
 - Thursday 8 – 12 (usually both of us)
- Practical exercises:
 - 12 groups, each with 20 students in average

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



How is the grade obtained?

- Two theoretical midterm exams (first in March, second in May), which lead to maximum 200 points
- Five group assignments, which lead to maximum 200 points
- Prerequisites to pass the exam:
 - Minimum 30% at each midterm exam
 - At least 100 points from both midterm exams together
 - At least 100 points from all group assignments together

15th workshop on Software Engineering Education and Reverse Engineering, Bohinj, 24 - 29 August 2015



The case study

- Technical specifications of the Electronic system for administration of documents connected with the Law of public hygiene in Macedonia
- The assignments are prepared by 3 students
- Each student must present its own view of the solution

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



First midterm exam (part 1)

- What is software engineering? (slightly extended with local job offers)
- Quality criteria for software products
- Software process models (slightly extended with slides announcing agile development)
- Topic 3a: Agile development (taken from Pressman)
- Basic concepts for the description of software development
- Results of the "Analysis and Definition" phase

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



First midterm exam (part 2)

- Cost estimation
- Modeling and product models
- Basic concepts / functional view
- Basic concepts of state oriented view
- Object oriented views (extended version)
- Basic concepts of scenario oriented view

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Second midterm exam (part 1)

- Object-oriented analysis (a-f)
- Object-oriented analysis (g-h)
- Formal specifications
- Overview of design phase
- Object-oriented design
- Implementation

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Second midterm exam (part 2)

- Introduction to testing
- Functional testing
- Structured testing
- Software metrics (slightly extended)
- Maintenance (introduced for the first time this year)

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Success of the students at the first midterm exam?

- Three groups of questions, two for Macedonian, one for the English class
- Macedonian groups:
 - Group 1: 88 students
 - Group 2: 85 students
 - In total: 173 students
- English group
 - 22 students

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

What was the average result at the first midterm exam?

Group of students	Students attending the midterm exam	Average result
English class	22	54.73
Group 1	88	40.86
Group 2	85	38.67
Macedonian class	173	39.78
Total	195	41.30

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

How many students didn't pass the exam?

Group of students	Successful	Failed	Failure rate
English class	17	5	22.73%
Group 1	58	30	34.09%
Group 2	53	32	37.65%
Macedonian class	111	62	35.84%
Total	128	67	34.36%

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

Success of the students at the second midterm exam?

- Many students decided to skip this midterm exam due to different reasons
- Macedonian groups:
 - Group 1: 56 students
 - Group 2: 52 students
- English group
 - 19 students

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

What was the average result at the second midterm exam?

Group of students	Students attending the midterm exam	Average result
English class	19	54.58
Group 1	56	58.27
Group 2	52	44.52
Macedonian class	108	51,65
Total	127	52.09

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

How many students didn't pass the exam?

Group of students	Successful	Failed	Failure rate
English class	14	5	26.32%
Group 1	51	5	8.93%
Group 2	38	14	26.92%
Macedonian class	89	19	17.59%
Total	113	24	17.52%

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

How many students didn't pass the exam?

Group of students	Successful	Failed	Failure rate
English class	14	5	26.32%
Group 1	51	5	8.93%
Group 2	38	14	26.92%
Macedonian class	89	19	17.59%
Total	113	24	17.52%

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



The final results so far

- 91 out of 230 students have successfully finished the course (13 out of 22 from English class included)
- The average points of all the students was 206.82/400 points (57.45%)
- The average grade of all the successful students was 8.19
- The average result of successful students:
 - Macedonian class: 8.15
 - English class: 8.38

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Why was the English class more successful?

- There are more good students in the English class than in other classes
- One proof to this statement: similar results were obtained during Artificial Intelligence course
- Another proof to this statement: English class was more successful at Introduction to computing course

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

Comparison of JCSE with AI course

SOFTWARE ENGINEERING		Number of students	Average grade
English class		22	54.74
Group 1		88	40.86
Group 2		85	38.67

ARTIFICIAL INTELLIGENCE		Number of students	Average grade
English class		19	62.97
Group 1		63	50.48
Group 2		78	48.45

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015

Comparison of JCSE with IntrComp course

SOFTWARE ENGINEERING		Number of students	Average grade
English class		22	54.74
Group 1		88	40.86
Group 2		85	38.67

INTRODUCTION TO COMPUTING		Macedonian groups	English class
Number of students		604	48
Dropout students		26	1
Dropout rate		4.30%	2.08%
Average		53.66	63.21

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



What did we conclude?

- The first release of JCSE in English was successful
- Students attending the English version demonstrated better results
- Non-English students benefitted from the materials and particularly the exam papers prepared in English
- The successful rate of English class was higher
- The results of non-English groups were the highest ever this year

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Probable explanation

- We were very motivated, which might be motivating for students as well
- The best students influenced hard work among team mates
- Competition among the best students was fruitful, no matter the language
- In an absence of proper SE terminology, English slides, assignments and exam papers reduce language ambiguity

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Further expectations

- We expect a good feedback from the class, to again have an opportunity to teach the JCSE course in English
- Since there are several very good students in the English class that enrolled in the academic 2014/15, there will be at least 20 students eligible to attend JCSE
- Greater readiness and competence of successful students to do internships abroad
- Good competence of students to be included in international outsourcing projects

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015



Thank you for your attention

😊😊😊

15th workshop on Software Engineering Education and Reverse Engineering Bohinj, 24 - 29 August 2015