Calculus
a blended approach

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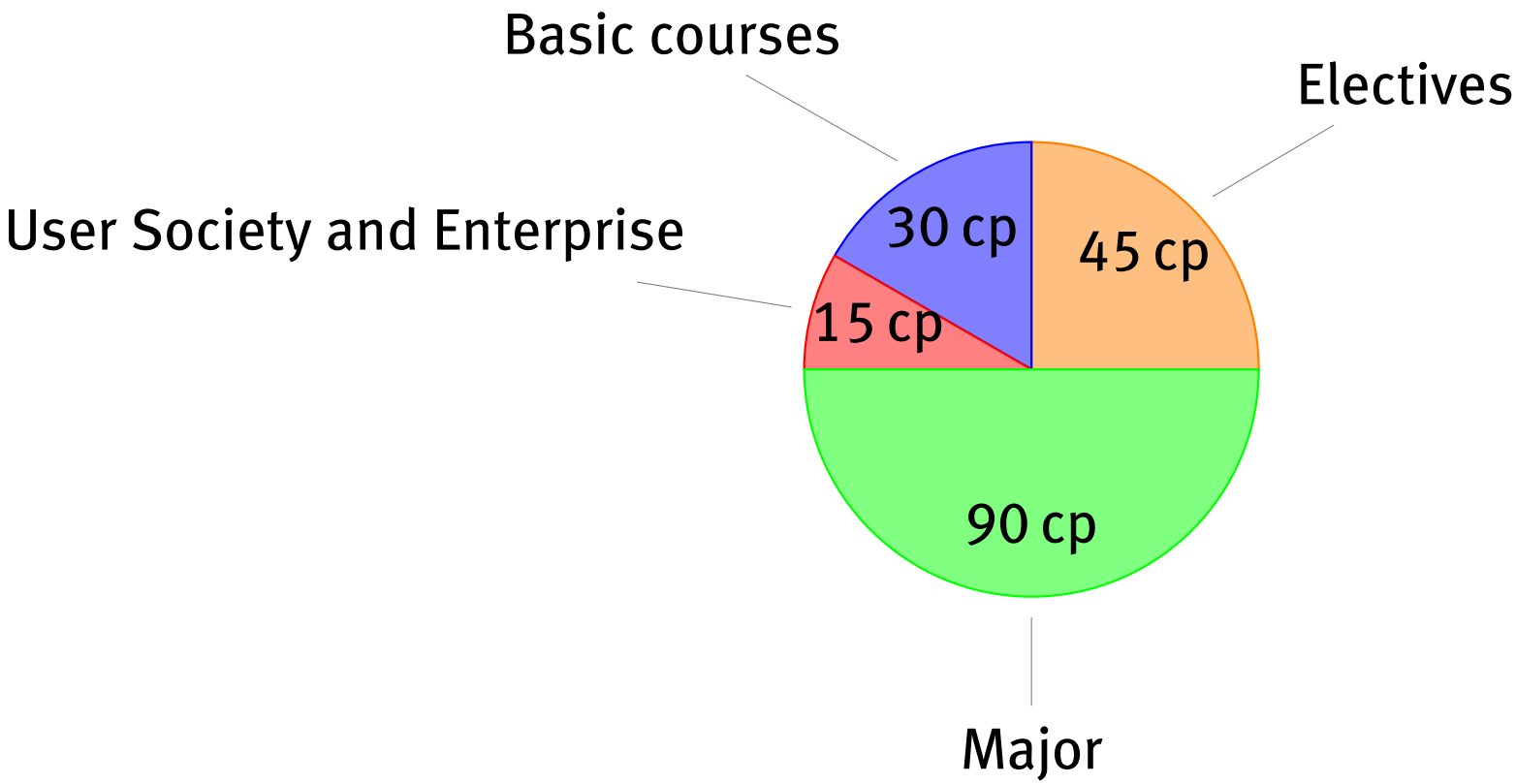
A new Bachelor, a new Calculus course



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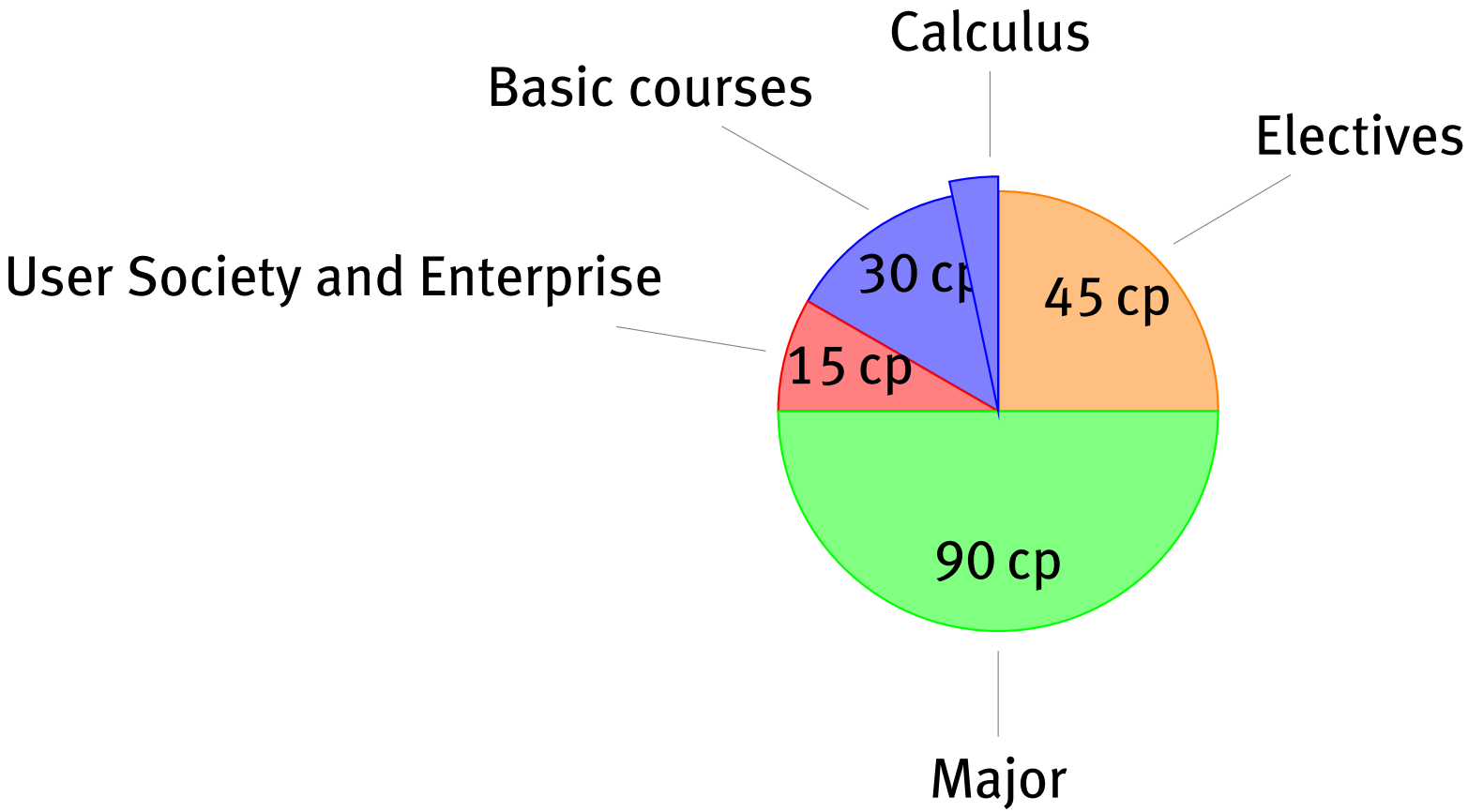

Challenges

- One course for all freshmen (2015: 2248 students)
- Challenging for all students (from Industrial Design to Physics and Math)
- Fun, good scores on student evaluations
- Higher passing rate (from 50% to 75%)
- Less hours from staff

Let students do the work

- Students work from or even before day one
- Students can work where and whenever they want
- Students can and should work together

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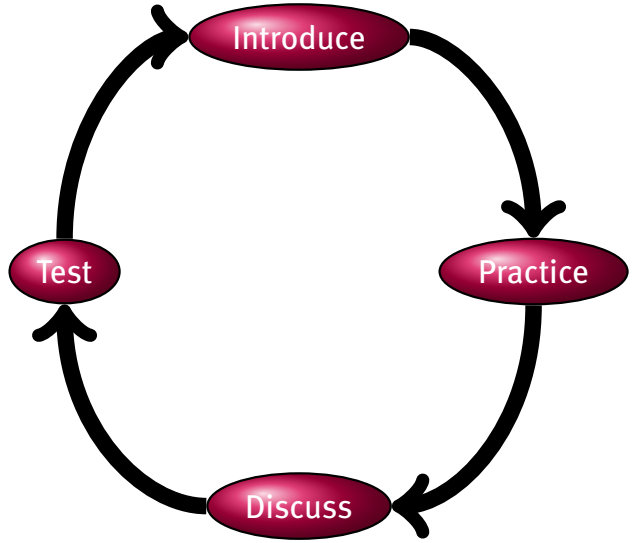
- Students can work where and whenever they want
- Students can and should work together
- Students get personalized feedback
- Students get rewards for their own work

A new blended approach

With four parts

- Introduction to the concepts
- Exploration of the material and practicing
- Cooperation and discussion
- Testing



A new blended approach

With four parts

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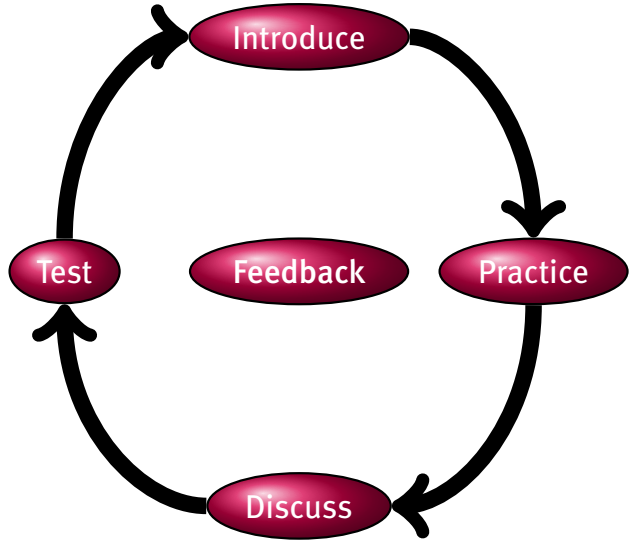
With in each part **individual feedback**



Introduction to the concepts

- 4+2 hours of lectures by our best teachers
- the +2 hours are spent on rehearsal and feedback (using clickers)
- supported by video lectures and web lectures

Exploration and practicing

- written homework handed in every week
- randomly chosen exercises graded and commented
- online homework, parametrized exercises with custom feedback
- results are all registered

Find the derivative of the function h given by

$$h(x) = \left(\sqrt{x} + 8\right)^8$$

$h'(x) =$ $8\cdot(\sqrt{x}+8)^7$ Submit

Sorry, this is not the derivative of $\left(\sqrt{x} + 8\right)^8$.

You did not appy the chain rule correctly.

Try to find functions f and g such that $f(g(x)) = \left(\sqrt{x} + 8\right)^8$ and then use the chain rule.

Did you forget to multiply with the derivative of g?

Try again, or have a look at the solution.

hint solution

To use the chain rule we have to find functions f and g such that $\left(\sqrt{x} + 8\right)^8 = f(g(x))$.

We can take $f(x) = x^8$ and $g(x) = \sqrt{x} + 8$.

So, the derivative of $\left(\sqrt{x} + 8\right)^8$ equals $h' = f'(g(x)) \cdot g'(x) = 8 \cdot \left(8 + \sqrt{x}\right)^7 \cdot \frac{1}{2} \cdot \frac{1}{\sqrt{x}}$

Score: 0 points.

Cooperation and discussion

- one hour meeting with 8 students and a tutor within a block of 2 hours
- students have the lead
- group can communciate through forum or WhatsApp
- trained tutor guides students (staff members and student assistents)
- tutor has overview of achievements of students and provides feedback
- tutor registers homework and checks presence

Ik heb geen idee wat ik hier zou moeten doen:

Suppose f and g are functions given by $f(x) = (x+4)2 - 3$ and $g(x) = x2 + 2$.

Determine $f \circ g$.

f o g? ik hoop dat ik niet al té veel vergeten ben >__<

Re: f o g?
by Alex de Jong - Wednesday, 2 September 2015, 10:29 PM

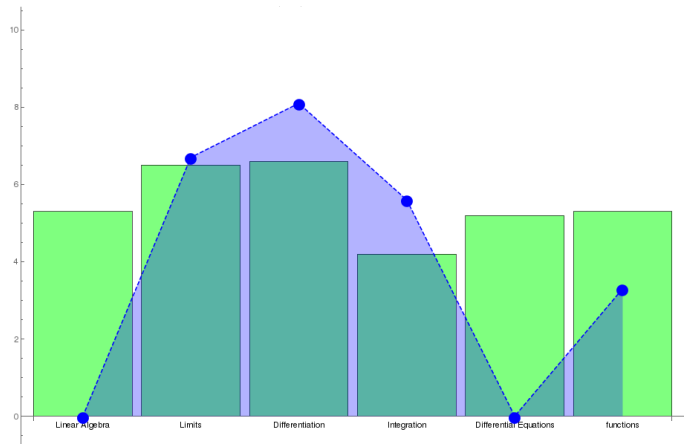
Bekijk eens pagina 35 (section p.5 definition 4) daar staat dat hele principe uitgelegd zover ik weet.

Re: f o g?
by Anne Fey - Thursday, 3 September 2015, 12:35 PM

Dank je Alex, dat wilde ik ook net zeggen :)

Testing

- Formative (but with rewards)
  - MC-test on highschool math in week one (10%)
    Start at day one, or even before!
  - weekly online tests (10%)
    Study regularly!
  - written test in week 5 (10%)
    Wake up call!
- Summative
  - Final Exam (70%, but grade must be at least 5.0)



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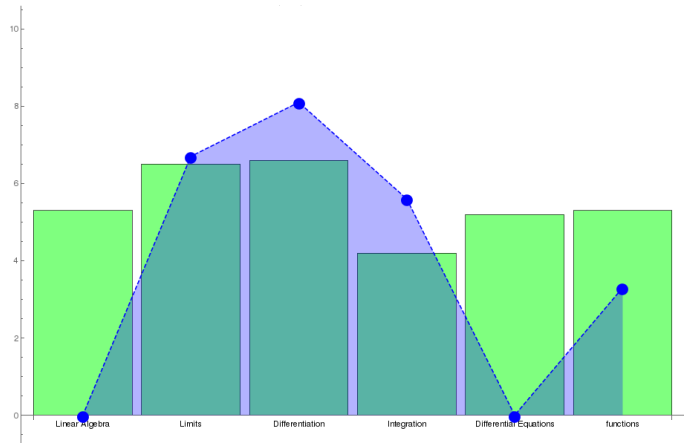
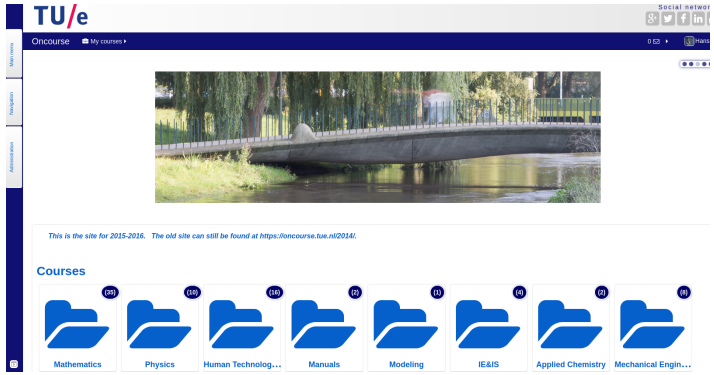


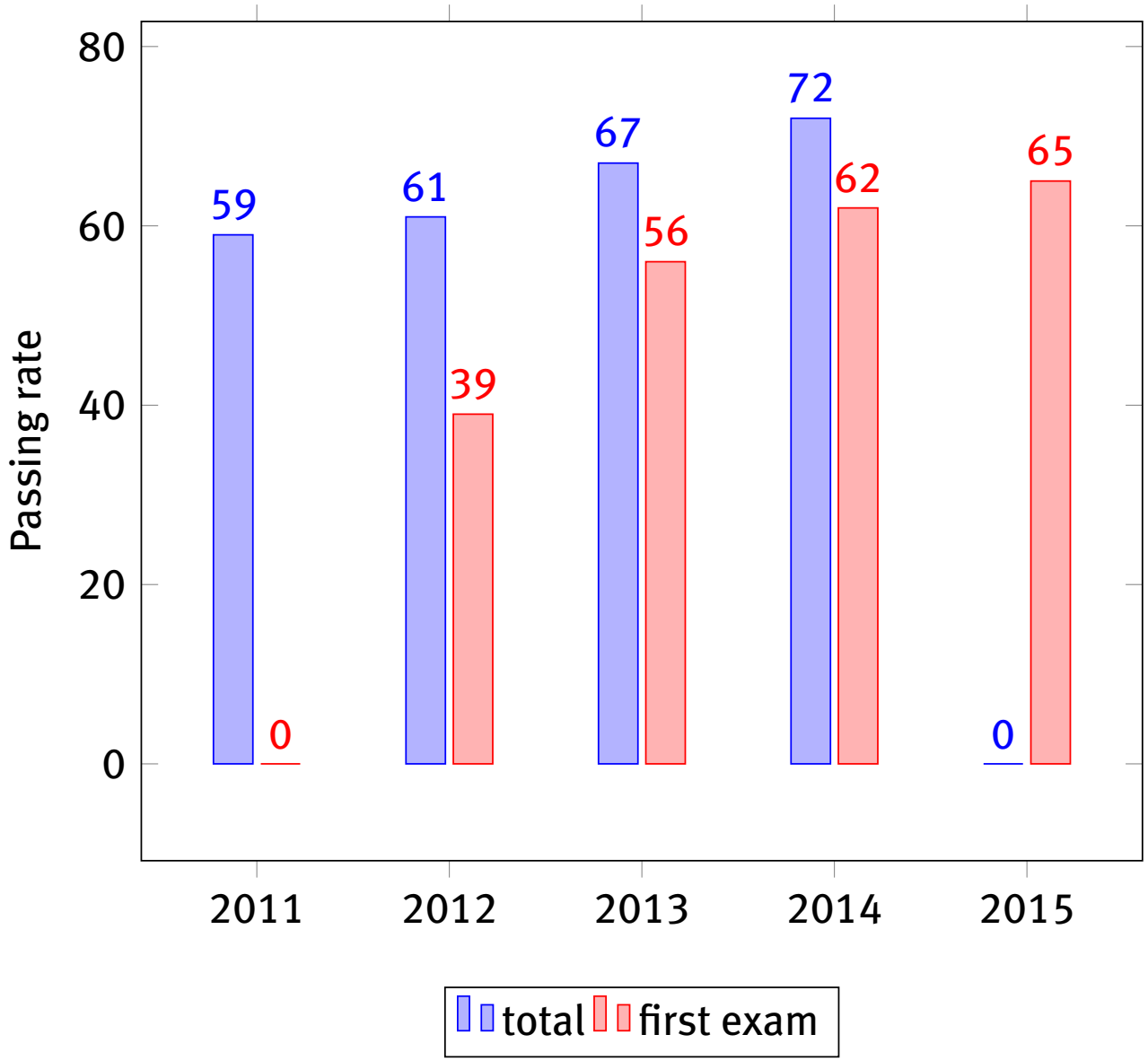
With feedback for every student

Realization

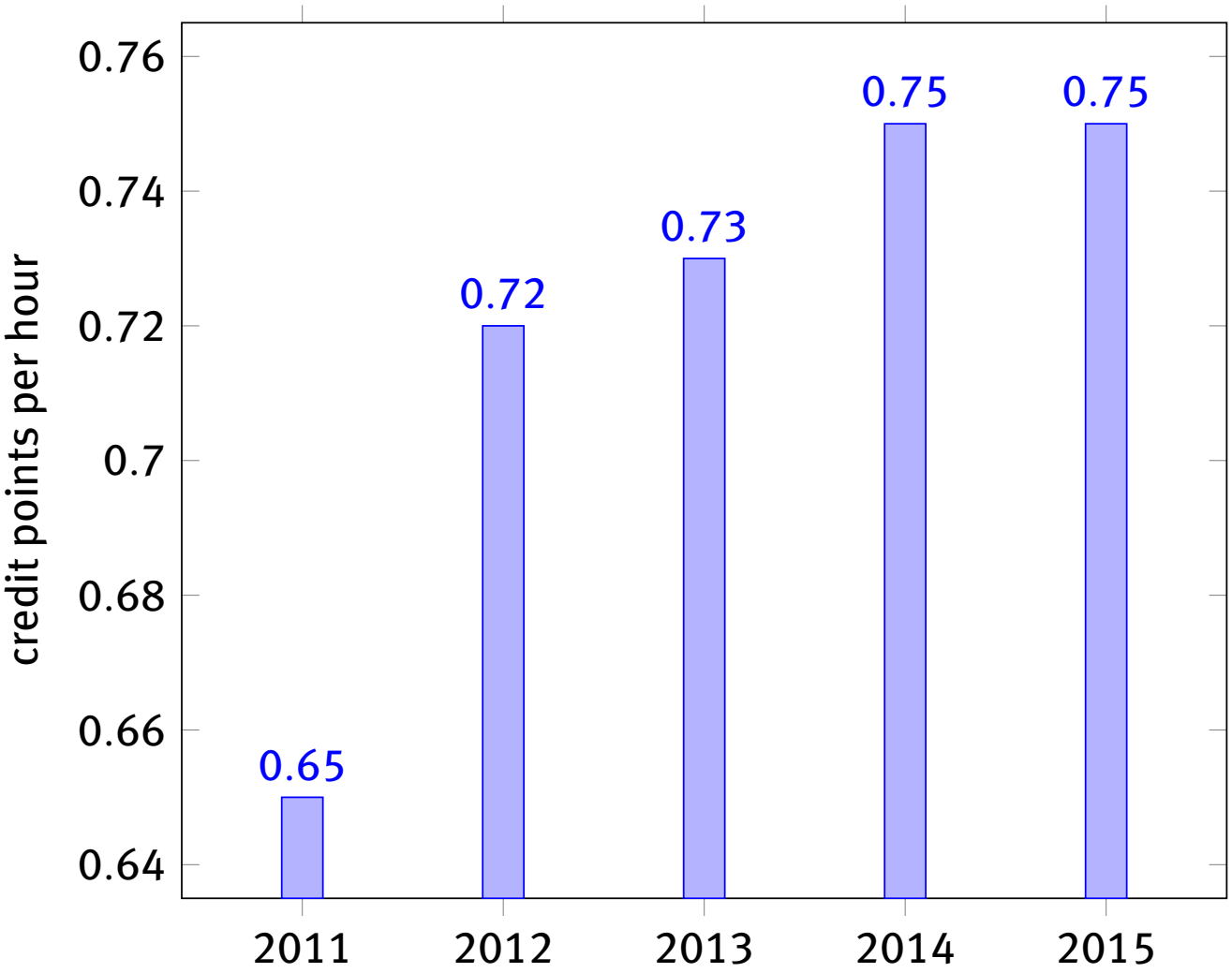
- Build an electronic learning environment based on Moodle and MathDox to support students, tutors and teachers
  (Now in use by more than 100 courses)
- Train teachers and tutors
- Give clear instructions to the students
- Constantly evaluate and improve
- Work and act as a team



Results: passing rates



Results: workload



Results: student satisfaction