

The background of the slide is a photograph of a university courtyard. In the foreground, there is a large fountain with multiple jets of water spraying upwards. Behind the fountain, a large, ornate building with a central dome and classical architectural features is visible. The sky is overcast. The text is overlaid on the image in a large, bold, white font with a black drop shadow.

A Game to Learn Natural Deduction for Propositional Logic

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The background features a large, semi-transparent pie chart on the right side, with several smaller pie charts scattered around it. At the bottom right, there is a bar chart with four vertical bars of increasing height from left to right. The entire background is a solid teal color.

- BsC: approx. 330 students
 - 2 programs: RO, EN
 - (new in 2025): AI
- MsC:
 - approx. 150 students
 - 6 master programs
- PhD School:
 - approx. 10-15

Logic in Computer Science

- Mandatory class for 1st year BsC. students
- Typical Student Profile:
 - Programming (C++)
 - High School Mathematics
 - Admission Contents (math or cs)

Logic in Computer Science



- Propositional Logic
 - Informal Logic
 - Formal Syntax and Semantics
 - Natural Deduction
 - Resolution
- First-Order Logic

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Natural Deduction

Inference Rules

\wedge -INTRO

$$\frac{\phi \quad \psi}{\phi \wedge \psi}$$

\wedge -ELIM-A

$$\frac{\phi \wedge \psi}{\phi}$$

\wedge -ELIM-B

$$\frac{\phi \wedge \psi}{\psi}$$

Formal Proof

1. $(p \wedge q) \wedge r$ Hypothesis
2. $p \wedge q$ \wedge -ELIM-A, Line 1
3. q \wedge -ELIM-B, Line 2
4. r \wedge -ELIM-B, Line 1
5. $q \wedge r$ \wedge -INTRO, Lines 3, 4

Pen & Paper

Wrong

1. $(p \rightarrow q)$	Hyp.
2. $\neg q$	Hyp.
3. q	\neg elim, Line 2
4. p	\rightarrow elim, Lines 1,3
5. $\neg p$	\neg intro, 4

Right

1.	$p \rightarrow q$	Hyp.
2.	$\neg q$	Hyp.
3.	p p	Hyp (assumption)
4.	q q	\rightarrow elim, Lines 1,3
5.	\perp \perp	\neg elim, Lines 2,4
6.	$\neg p$	\neg intro, Line 5

LND

UNDO REDO Level: 1/32 NEXT LEVEL

$(p \wedge q)$
 r
⋮
 $(q \wedge r)$

$P (P \rightarrow Q)$ $(P \rightarrow Q) (\neg Q)$ $P Q$ $(P \wedge Q)$
 Q $(\neg P)$ $(P \wedge Q)$ P

$(P \wedge Q)$ P $(\neg(\neg P))$ P Q \perp
 Q $(\neg(\neg P))$ P $(P \vee Q)$ $(P \vee Q)$ P

$P (\neg P)$ $(P \vee (\neg P))$ P $(\neg P)$ P
 \perp $(P \vee (\neg P))$ \perp \perp Q
 $(\neg P)$ P $(P \rightarrow Q)$

$(P \vee Q)$ P Q
 \vdots \vdots
 R R
 R