

I201-Mathematical Foundations of Informatics

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My proposal

- ▶ Syllabus
- ▶ Rationale
- ▶ Remarks

The box

- ▶ *Input:* MATH M118, INFO I101
- ▶ *Output:* INFO I210, I211, I308, maybe others

- ▶ Propositional Logic
- ▶ Set Theory
- ▶ Predicate Logic
- ▶ Induction and Recursion
- ▶ Functions and Relations

First level of formalization.

- ▶ Truth tables
- ▶ Truth trees
- ▶ Checking tautologies
- ▶ Logical equivalences
- ▶ Consistent sets of formulas
- ▶ Arguments and validity
- ▶ Translation
- ▶ Formal proofs (Fitch-style natural deduction)

Language of mathematics and intro to Predicate Logic.

- ▶ Sets
- ▶ Cartesian Product
- ▶ Power set
- ▶ Set operations
- ▶ Set identities

Second level of formalization. More expressive formal system, less abstract but more complicated to deal with.

- ▶ Formulas
- ▶ Meaning
- ▶ Validity
- ▶ Translation

A proof technique most useful in computing. Defining objects by self-reference.

- ▶ Weak Induction
- ▶ Strong Induction
- ▶ Structural Induction
- ▶ Recursive Definition

Relational thinking. Constructing and analyzing relationships.

- ▶ Injective functions
- ▶ Surjective functions
- ▶ Invertibility of functions, and the theorem
- ▶ Equivalence relations
- ▶ Partial orders

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- ▶ Specific mathematical structures and their properties.

- ▶ Not enough time to cover the last two topics adequately.
- ▶ Lab needs careful attention and much better design, mini projects, more interactive.
- ▶ Integration of some other relevant software packages?
- ▶ More examples from everyday life: Puzzles, Social Networks, Voting Theory, Social Choice Theory, . . .
- ▶ Strengthening the problem solving component.