Proofs are Programs Summary

- **Write purely functional programs in Coq**
  - natural numbers, lists, maps, trees, program syntax
- **Verify these programs by proving theorems about them**
  - case analysis, induction, inversion, tactics, ...
- **Curry-Howard correspondence**
  - proofs = typed purely functional programs
- **Simple imperative programming language**
  - syntax and operational semantics

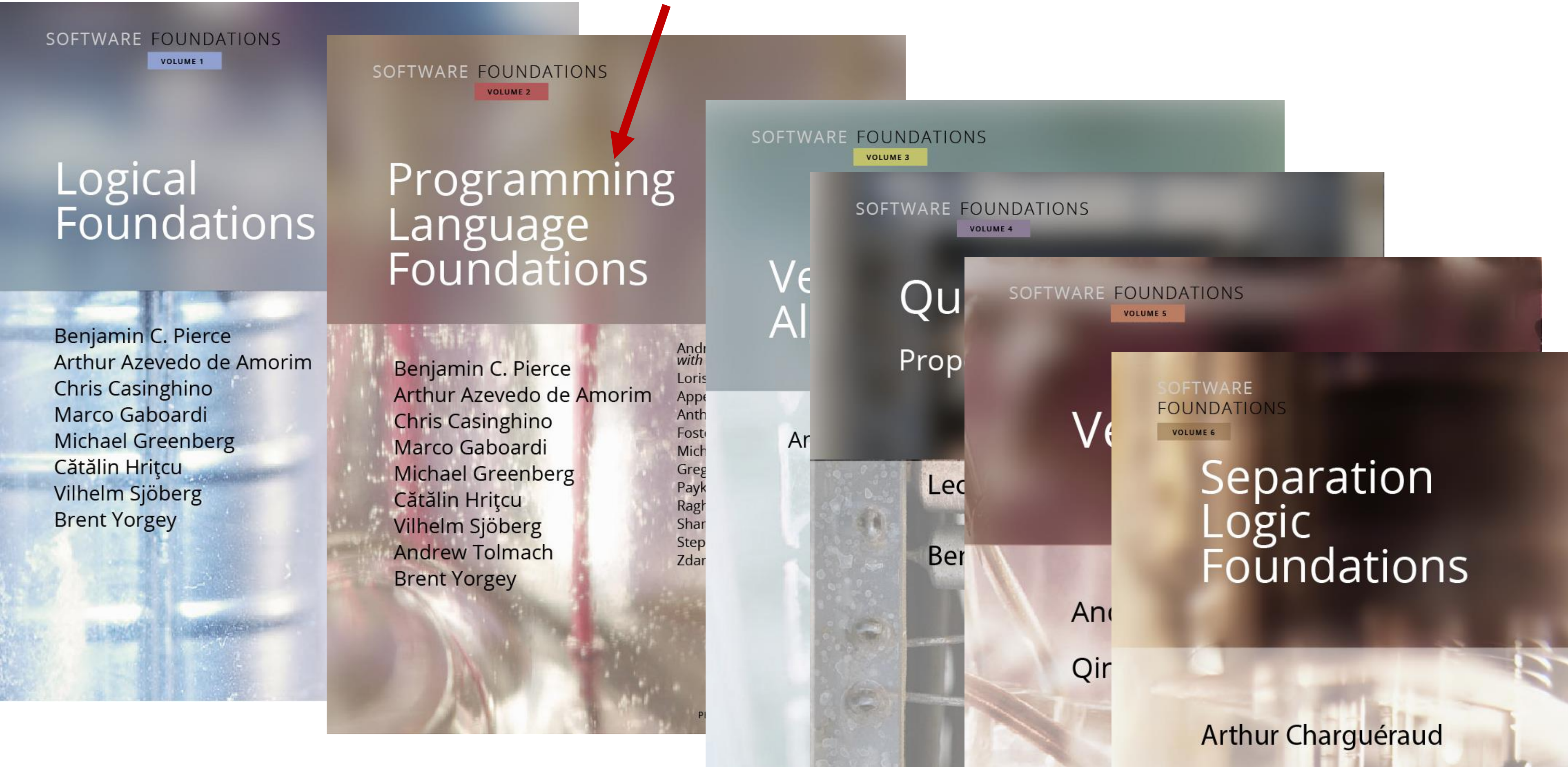
["Le coq mécanisé"
picture by Lilia Anisimova]

Course evaluation starts today

- **Please participate**
  - your feedback is very important to us
  - help us make this better!
- **2 evaluation forms**
  - one standard form from RUB
  - one specific form from us
- **More details via email/Moodle today**

Follow-up course next semester

Lecturers: Cătălin Hrițcu and Rob Blanco



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Logical Foundations
Benjamin C. Pierce
Arthur Azevedo de Amorim
Chris Casinghino
Marco Gaboardi
Michael Greenberg
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Programming Language Foundations
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VOLUME 6
Separation Logic Foundations
Arthur Charguéraud

Foundations of Everything

λ

- **Programming Languages**
  - Imp and Simply Typed Lambda-Calculus (functional)
  - type systems, program equivalence, semantics, metatheory
- **Verification**
  - Hoare Logic: verify Imp programs
  - Relational Hoare Logic
- **Security**
  - Information Flow Control: enforcing noninterference
    - Static enforcement: types, RHL, cryptographic constant time
    - Dynamic enforcement: Secure Multi-Execution, ...

reflect
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Maps.v