# This course

1. Logic and proofs
2. Functional programming
3. Program verification

- **Using the Coq proof assistant**
- **Curry-Howard correspondence**
  - –proofs = purely functional programs
  - –bridge between logic and computer science

# Next steps

- **Software Foundations** and **other Coq books**
- More about the **Curry-Howard correspondence**
- More about **functional programming**
- **Verifying programs with side-effects in F***

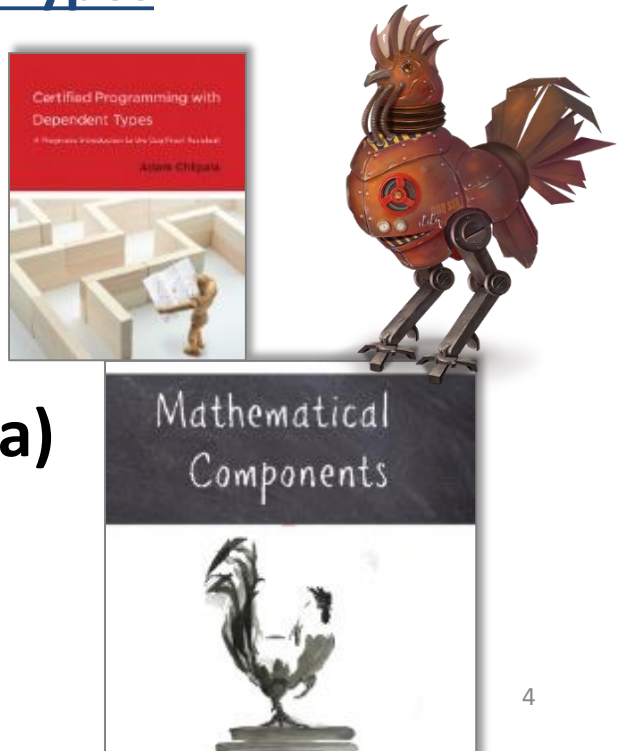
# Software Foundations


- **Volume 1: Logical Foundations**
  - **More exercises:** advanced, optional
  - **More chapters:** Regular expressions, While programs, Lexing and Parsing, More automation, Extracting ML from Coq
- **Volume 2: Programming Language Foundations**
- **Volume 3: Verified Functional Algorithms**
- **Volume 4: QuickChick: Property-Based Testing in Coq**

https://softwarefoundations.cis.upenn.edu

# Other Coq books, more advanced

- **Adam Chlipala (MIT):**
  - Certified Programming with Dependent Types
  - Formal Reasoning About Programs
- **Ilya Sergey (Yale-NUS College):**
  - Programs and Proofs -- Mechanizing Mathematics with Dependent Types
- **Assia Mahboubi and Enrico Tassi (Inria)**
  - Mathematical Components **book**



# More about the Curry-Howard correspondence

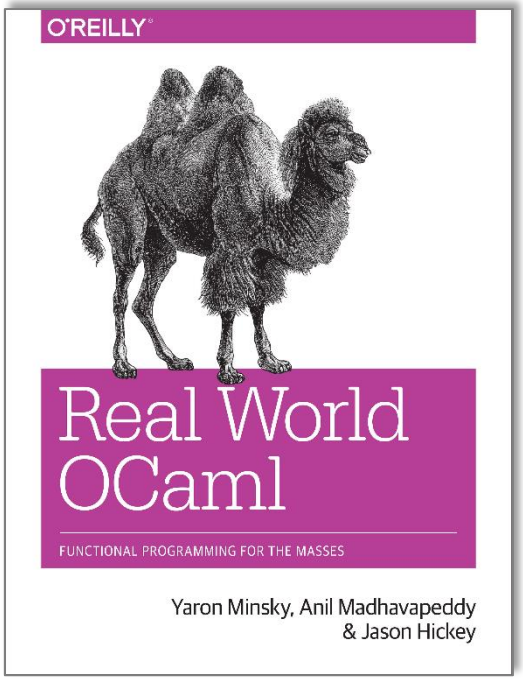
- Phil Wadler's **Propositions as Types** paper
  - **various talks** available online too

- Xavier Leroy's College de France course
  - **Programmer = démontrer ? La correspondance de Curry-Howard aujourd'hui**

# More about functional programming

- OCaml MOOC -- **Classes Start: 22 September 2019**

- **Book:** Real World OCaml, Functional Programming for the Masses



# Verifying programs with side-effects in F*

- **Functional programming language with effects**
  - like OCaml, Haskell, F#, ...
- **Semi-automated verification system using SMT**
  - like Dafny, FramaC, Why3, …
- **Expressive core based on dependent type theory**
  - **like Coq**, Agda, Lean, …

**https://fstar-lang.org**