

# **Programming Languages Theory and Pragmatics**

Igor Dimitrov

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# 1

2025-03-21 # Preface {.unnumbered}

This is a Quarto book.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

## 2 Reading List

### 2.1 Pragmatics, Practical, General Intro

- Principles of Programming Languages. MacLennan
- Programming Languages - Concepts & Constructs. Sethi
- Programming Language Pragmatics. Scott
- Programming Language Concepts. Sebesta
- Programming Languages - Principles and Practice. Louden, Lambert

### 2.2 PL Theory

#### 2.2.1 Intro

- Concepts in Programming Languages. Mitchell
- Principles of Programming Languages. Tennent
- Introduction to the Theory of Programming Languages. Meyer
- Introduction to the Theory of Programming Languages. Dowek, Levy
- Principles of Programming Languages. Dowek
- Programming Language Concepts (2nd Ed). Sestoft
- Programming Language Linguistics. Gelernter
- Programming Language Theory and its Implementation - Applicative and Imperative Paradigms. Gordon
- Dynamically Typed Languages. Laurence Tratt
- On Understanding Types, Data Abstraction, and Polymorphism. Cardelli, Wegner
- Programming Language Explorations (2nd ed). Toal, Strieker, Berardini
- An Introduction to Data Types. Cleaveland

#### 2.2.2

- Types and Programming Languages. Pierce
- Essentials of Programming Languages. Friedman, Wand
- Theories of Programming Languages. Reynolds
- Practical Foundations for Programming Languages. Harper

- The Formal Semantics of Programming Languages - An Introduction. Winskel
- Foundations for Programming Languages. Mitchell
- Concepts and Semantics of Programming Languages - A Semantical Approach with OCaml and Python. Hardin et al
- Concepts and Semantics of Programming Languages - Modular and Object-Oriented Constructs with OCaml, Python, C++, Ada, and Java. Hardin et al
- Semantics of Programming Languages. Tennent
- Semantics of Programming Languages - Structures and Techniques. Gunter
- The Structure of Typed Programming Languages. Schmidt
- Abstract Computing Machines - A Lambda Calculus Perspective. Kluge
- Design Concepts in Programming Languages. Tubak, Gifford, Sheldon
- Understanding Programming Languages. Cliff B Jones
- Computation and Deduction. Pfenning
- Programming Language Foundations. Aaron Stump
- The Foundations of Program Verification. Loeckx, Sieber
- Abstract Interpretation: A Unified Lattice Model for Static Analysis of Programs by Construction or Approximation of Fixpoints. Cousot, Cousot

### **2.2.3 Theory of OOP Languages**

- A Theory of Objects. Abadi, Cardelli
- Foundations of Object-Oriented Languages - Types and Semantics. Bruce

### **2.2.4 Denotational Semantics**

- A Practical Introduction to Denotational Semantics. Allison
- Denotational Semantics - A Methodology for Language Development. Schmidt
- Denotational Semantics - Lecture Notes. Winskel

### **2.2.5 Connection Between Hoare Semantics, While Semantics etc**

- Predicate Transformer Semantics. Manes
- Programs, Recursion and Unbounded Choice. Hesselink
- While Loops and Programs. Harold Simmons
- Connections Between Predicate Transformers and Denotational Semantics. Jensen

### **2.2.6 Induction and Inductive Definitions**

- Forms of Recursion and Induction. Simmons
- An Introduction to Inductive Definitions. Aczel

## 2.3 Lambda Calculus, Type Theory, Intuitionistic Logic, Constructive Mathematics

### 2.3.1 Type Theory

- Type Systems for Programming Languages. Harper
- Martin-Loef's Type Theory. Norstroem, Petersson, Smith
- Programming in Martin-Loef's Type Theory - An Introduction. Norstroem, Petersson, Smith
- Intuitionistic Type Theory. Per Martin-Loef
- Homotopy Type Theory - Univalent Foundations of Mathematics
- Proofs and Types. Girard, Taylor, Lafont
- Constructive Logics - Part I: A Tutorial on Proof Systems and Typed  $\lambda$ -Calculi. Jean Gallier
- Do-it-Yourself Type Theory. Backhouse, Chisholm, Malcolm, Saaman
- On the Meaning and Construction of the Rules in Martin-Loef's Theory of Types
- Propositions and Specifications of Programs in Martin-Loef's Type Theory. Norstroem, Smith
- Derivation of a Parsing Algorithm in Martin-Loef's Theory of Types. Chisholm
- Propositions as Types. Philip Wadler
- Constructive Mathematics and Computer Programming. Martin-Loef
- Introduction to Generalized Type Systems. Barendregt
- Polymorphic Typing of an Algorithmic Language. Xavier Leroy
- Typed Lambda Calculus / Calculus of Constructions. Brandl
- Treatise on Intuitionistic Type Theory. Granstroem
- Type Theory and Formal Proof. Nederpelt, Guevers

### 2.3.2 Logic

- Set Theory for Computing Science. Glynn Winskel
- Proof and Disproof in Formal Logic. Bornat
- Introduction to Computation - Haskell, Logic, and Automate. Sannella, Fourman, Peng, Wadler
- The Computer Modelling of Mathematical Reasoning. Alan Bundy
- Modelling Puzzles in First Order Logic. Groza

#### 2.3.2.1

- Intuitionistic Logic. Dirk Van Dalen
- On The Meanings of the Logical Constants and the Justifications of the Logical Laws. Per Martin-Loef

- Natural Deduction - A Proof-theoretical Study. Prawitz
- Natural Deduction. Tennant
- Logic and Computation - Interactive Proof with Cambridge LCF. Paulson
- Axiomatic Method and Category Theory. Rodin

### 2.3.3 Lambda Calculus

- Lambda-Calculus, Combinators, and Functional Programming. Revesz
- Functional Programming and Lambda Calculus. Barendregt
- Introduction to Lambda Calculus. Berengregt, Barendsen
- Lambda Calculus with Types. Barendregt, Dekkers, Statman
- Lambda Calculi with Types. Barendregt

## 2.4 Proof Assistants, Programs as Proofs, Curry-Howard Isomorphism

- Programs as Proofs: A Synopsis. Constable
- Proofs are Programs: 19th Century Logic and 21st Century Computing. Wadler
- Programs as Proofs. Jorgen Steensgaard-Madsen
- On the Correspondence Between Proofs and  $\Lambda$ -Terms. Gallier

### 2.4.1

- Program = Proof (Agda). Samuel Mimram
- Interactive Theorem Proving and Program Development. Coq'Art: The Calculus of Inductive Constructions. Bertot, Castéran
- Mathematical Components (Coq). Mahboubi, Tassi.

#### 2.4.1.1 Isabelle

- A Proof Assistant for Higher-Order Logic with Isabelle. Nipkow, Paulson, Wenzel
- Concrete Semantics with Isabelle/HOL. Nipkow, Klein

### 2.4.2

- Lectures on the Curry-Howard Isomorphism. Sorensen
- Derivation and Computation - Taking the Curry-Howard Correspondence Seriously. Simmons
- Adapting Proofs-as-Programs - The Curry-Howard Protocol. Poernomo, Crossley, Wirsing
- Natural Deduction and the Curry-Howard Isomorphism. Andreas Abel

### 2.4.3 Dependent Type Theory

- Programs and Proofs - Mechanizing Mathematics with Dependent Types, Lecture Notes (Coq). Ilya Sergey
- Certified Programming with Dependent Types (Coq). Chlipala
- Dependently Typed Programming in Agda. Ulf Norell, James Chapman
- Type-driven Development with Idris. Edwin Brady

## 2.5 Category Theory

- An Introduction to Category Theory. Simmons
- Basic Category Theory. Leinster
- Category Theory (2nd ed). Steve Awodey
- Category Theory in Context. Emily Riehl
- Category Theory for Computing Science. Barr
- Basic Category Theory for Computer Scientists. Pierce
- Category Theory and Lambda Calculus. Mario Roman Garcia
- Category Theory as an Extension of Martin-Loef Type Theory. Dyckhoff
- Lecture Notes in Category Theory. Winkler