

# Curriculum Vitæ

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Thanos Tsouanas

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## ► Personal details

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## Spoken languages

Greek (native); English (proficient); Brazilian Portuguese (fluent).

## ► Studies & academic positions

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- 2016–** **Associate professor** (permanent position) in Instituto Metr pole Digital of UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE (UFRN), Brazil.
- 2015** Postdoctoral researcher in the Mathematics Department of UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE (UFRN), Brazil.
- 2014** PhD from  COLE NORMALE SUP RIEURE DE LYON, under the supervision of Olivier Laurent, in the field of **theoretical computer science**. I was employed by CNRS under the **Marie Curie fellowship** “MALOA”, and had a 1-month secondment split between the UNIVERSITY OF OXFORD (in the team of Luke Ong) and  COLE POLYTECHNIQUE (in the team of Dale Miller).  
**Thesis title:** *On the Semantics of Disjunctive Logic Programs*<sup>1</sup>
- 2010** Master of Science degree from MPLA (graduate program in Logic, Algorithms and Computation of the UNIVERSITY OF ATHENS and of the TECHNICAL UNIVERSITY OF ATHENS),<sup>2</sup> **mathematical logic** specialty, grade 8.23/10.
- 2007** Bachelor’s degree from the Department of Mathematics of the UNIVERSITY OF ATHENS, specialty of **pure mathematics**, grade “excellent” (8.51/10).

## Seminars and schools

- **Logoi** school on Linear Logic and Geometry of Interaction. Torino, Italy (2013)
- **ISR2012** 6th International School on Rewriting. Valencia, Spain (2012)
- **LICS** pre-conference tutorial day on *term rewriting systems*: Dubrovnik, Croatia (2012)
- **MAP** international spring school on Formalization of Mathematics: INRIA, Sophia–Antipolis (2012)
- **EPIT-GAMES** spring school on language theory, games & applications: Carcans, France (2011)
- **MALOA training workshop** Fischbachau, Germany (2010); Leeds & Oxford, UK (2011 & 2012)
- **Midlands Graduate School** in the Foundations of Computer Science: Birmingham, UK (2008)
- **Summer School of Mathematics** University of Crete & FORTH (2004)

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<sup>1</sup>Both my thesis and the slides of my defense are available on my website.

<sup>2</sup><http://mpla.math.uoa.gr/>

## ► Research & academic activities

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For the most part of my PhD studies, I was working on game semantics and logic programming. Firstly, I extended the game semantics of LP<sup>3</sup> to cover finite propositional *disjunctive* logic programs. Next, I showed how to deal with *infinite* propositional DLP: an important step, since it allows one to give a semantics to first-order disjunctive logic programs. My paper with these results was published in 2013 (see below) and you can find it online on my website, together with slides from a related talk. By finding connections between these games and the Hyland–Ong games used in functional programming one could provide a semantical link between the two programming paradigms through games. The formalization and overall development of the DLP games was made with this goal in mind.

I defined an abstract semantic framework for denotational semantics of logic programs, and a semantic operator which transforms any given semantics of a non-disjunctive language to a new semantics, of the equivalent disjunctive language. I used this operator to obtain a novel game semantics for DLPN.

I am currently investigating how these results can be applied in higher-order logic programming and the underlying proof theory.

**Research interests:** mathematical foundations, denotational semantics of programming languages, set theory, order theory, proof theory.

### Journal publications

- Thanos Tsouanas, **A game semantics for disjunctive logic programming**<sup>4</sup>  
ANNALS OF PURE AND APPLIED LOGIC, Elsevier, 2013.

### Articles in preparation

- Thanos Tsouanas, **An abstract semantic framework for logic programming**
- Thanos Tsouanas, **An encoding of disjunctive logic programs to non-disjunctive ones**

### Talks

- **Game semantics for logic programming:**
  - MALOA 2010 training workshop: Fischbachau, Germany
- **A game semantics approach for finite, propositional disjunctive logic programs:**
  - GaLoP VI (Games for Logic and Programming Languages): Saarbrücken, Germany
  - LAC–GeoCal 2011: École Polytechnique, Paris, France
  - MALOA 2011 training workshop: Leeds, UK
  - PL Seminar NTUA/IEEE-GR 2011 seminar: Athens, Greece
- **A game semantics for disjunctive logic programs:**
  - University of Oxford (May 2012)
  - University of Bath (Sep 2012)
  - LIX, École Polytechnique, Paris (Jan 2013)
  - UFMG, Belo Horizonte, Brazil (Mar 2014)
- **On the semantics of disjunctive logic programs:**
  - Demokritos Research Center, Athens, Greece (Jan 2015)
  - UFRN, Natal, Brazil (Mar 2015)

### Participation in conferences & scientific events

- **Réalisabilité à Chambéry 2011.**
- **ETAPS 2011** Saarbrücken, Germany.
- **LI2012** (Logic and Interactions), CIRM, Marseille, France.
- **CHoCoLa** (Curry–Howard: Logic and Computation), monthly seminar in Lyon, France.
- **LICS2012**, (Logic in Computer Science) June 25–28, 2012, Dubrovnik, Croatia.
- **GaLoP VII**, June 29, 2012, Dubrovnik, Croatia.

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<sup>3</sup>(D)LP(N) stands for (Disjunctive) Logic Programming (with Negation).

<sup>4</sup><http://www.tsouanas.org/docs/tsouanas-dlpgames.pdf>

## ► Distinctions & awards

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**Mathematics.** (1) Two scholarships for excellence in studies and for *student with the highest grades* for the year 2002–2003 at the Mathematics Department of the University of Athens, from the National Foundation IKY. (2) **Marie Curie** fellowship for PhD 2010–2013. (3) My PhD thesis has been used as the example on a multi-disciplinary “*How to write a thesis*” seminar organized by Katya Komendantskaya at HERIOT–WATT UNIVERSITY.

**Music composition.** Best original soundtrack composition prize for the computer game HERO QUEST 6.<sup>5</sup>

**Web development.** Second prize on a panhellenic web development contest of AMSTEL (in 1996).

## ► Computer skills

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I develop open source software, web applications, libraries and scripts, about which you can find more information on my website and GitHub. I also administer servers with multiple users, who rely on them for their email, web hosting, proxies, file storage, databases, backups, etc.

### Computer languages

- Haskell, Ruby, Python, C, Racket, Scala, Java. . .
- Coq, Idris, Agda, Isabelle, λProlog
- T<sub>E</sub>X & L<sub>A</sub>T<sub>E</sub>X
- Shell scripting & Unix programming
- HTML, CSS, JavaScript
- SQL, Sinatra, Elm, Django, Ruby on Rails, . . .

### Operating Systems

Over 18 years of experience in the **BSD Unix** operating systems, especially in **OpenBSD**. I am also experienced in other Unix-like systems, including various distributions of **Linux**.

### System & network administration

- **web servers** (nginx, httpd & relayd)
- **mail servers** (OpenSMTPD, Postfix, qmail)
- **file servers** (FTP, Samba, NFS)
- **domain name servers** (named)
- **firewalls & routers** (PF packet filter)
- **databases** (PostgreSQL)

### Web development & databases

I am a seasoned web developer (began with the first version of HTML in 1995), now using HTML5, CSS, and jQuery/CoffeeScript for web design and Ruby, Elm, Python, and Haskell (usually with web frameworks such as Sinatra, Django, Ruby on Rails, Yesod, etc.) for web development and interaction with databases.<sup>6</sup> I have a good command of SQL and of the relational database management systems **PostgreSQL** and **SQLite**.

### Audio & graphics

More than 20 years of experience in **MIDI sequencing** and audio recording, using audio software applications such as Reaper, Cubase, Audacity and Ozone iZotope, for composing, recording and editing music and audio in general. Good level of the image creation and editing application **GIMP**, for designing and editing graphics for websites, programs, covers, etc.

## ► Music

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I have been composing, arranging, orchestrating and performing music since 1996. I enjoy mixing, mastering, recording, and producing music. You can find more information and music samples on my music website<sup>7</sup> and on Spotify. I play (my skill varying from awful to intermediate) the following musical instruments, among others: piano, guitar, baroque recorders, glockenspiel, ocarina, lauto, . . .

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<sup>5</sup><http://the.thanos.band/fairies/>

<sup>6</sup>Many years ago, I used to code in PHP, ColdFusion, ASP, Java, etc., but luckily these days are over.

<sup>7</sup><http://the.thanos.band/>

## ► Working experience (in industry & academia)

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Here are some of the jobs I have had along with a short description of my duties.

**UFRN, IMD (2016–)** Associate Professor (permanent position) at the “Instituto Metr pole Digital” of UFRN. Duties focus on teaching but also include: research, course design, academic orientation and supervision of students, as well as some administrative work. (See next section for some details on my teaching.)

**UFRN, Mathematics Department (2015)** Postdoctoral researcher in the department of mathematics of UFRN.

**CNRS (2010–2014)** Employed as a researcher to complete my PhD studies in mathematical logic under the Marie Curie fellowship “MALOA”.

### **Springer Verlag Publishing (2005, 2009, 2010)**

- Proof-reading of Y. N. Moschovakis’s book *Notes on Set Theory*, 2nd edition.
- Proof-reading of M. Chlouveraki’s book *Blocks and Families for Cyclotomic Hecke Algebras*.
- Typesetting, diagram design and indexing for the greek translation of S. Lang’s *Algebra*.

**MPLA graduate program, University of Athens (2007–2010)** Setup and system administration of the main server (OpenBSD) for the postgraduate program MPLA. Web development and design of the rather sophisticated website of MPLA (still running)<sup>8</sup> for which I developed my university-targeted framework **schole**, mostly written in Django, with PostgreSQL & SQLite database backends. This is a complete administrative system for students, professors, and secretary alike, with course registrations, scheduling, graduation management, e-courses, etc.

### **Nefeli Publishing (2007, 2009)**

- Translation into greek, editing, proof-reading and L<sup>A</sup>T<sub>E</sub>X typesetting, of Y. N. Moschovakis’s book *Notes on Set Theory*, 2nd edition.
- Typesetting of a collective volume of articles on logic, edited by D. Anapolitanos.

### **Mathematics Department, University of Athens (2002–2009)**

- Preparation and teaching of mini-courses and seminars (see next section for details).
- Technical support for the 4th Computability in Europe conference, CiE2008.
- Computer labs assistant (2002–2003) doing Unix system administration and web development.

**Alpha News 98,7 FM (03/2001–05/2002)** I was the web developer & designer for the radio station’s website. I designed a new website from scratch; and developed the content management system (in PHP & Oracle) to be used by reporters. I provided constant (24/7) support and trained the reporters who had zero to light computer experience, to use my web application.

**School of Civil Engineering, NTUA (2009)** Web development and design of the school’s website. System administrator of the department’s main server (OpenBSD).

**the.undead.host (2015–)** Sysadmin, web developer, and lead software engineer.

**Zermelo Hosting Services (2002–2008)** System administrator (OpenBSD) of servers (dns, web, mail, database), tech support for my hosting and web development/design customers, with 0 downtime and neither security nor performance issues.

**1st high school of Kessariani, Athens (2004–2005)** Technical support for five educational programs for high school teachers, organized by the Greek Ministry of Education. System administration of Windows 2000 Server and Red Hat Linux machines, as well as instructor for some of the lectures.

**Hellenic Mathematical Society (2005)** Assistant in the organization of the 9th Junior Balkan Mathematical Olympiad, Veria, June 2005.

**Freelance programmer** developing software and web applications for individuals and companies.

**Tutoring** of university students, both private lessons and group classes (see the next section for details).

**Hero6 (2003)** Honorary member of the development team of *Hero Quest 6* as an original music composer.

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<sup>8</sup><http://mpla.math.uoa.gr/>

## ► Teaching experience

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More information about my recent teaching activities (including full courses, mini-courses, tutorials, projects, etc.) can be found on my teaching website.<sup>9</sup>

### Full teaching of undergraduate and postgraduate courses as a Professor

Since the beginning of 2016, I have been teaching 2–3 courses per semester. The *different* courses I have taught so far (along with corresponding semesters in parentheses) are:

#### FMC1: Mathematical Foundations for Computer Science I (2016.1, 2×2016.2)

6h/week; 90 credits; required course

Mathematical logic; induction and recursion; number theory; modular arithmetic; combinatorics.

#### FMC2: Mathematical Foundations for Computer Science II (2016.1, 2×2017.1)

6h/week; 90 credits; required course

Mathematical logic; sets, relations, functions; countable and uncountable sets; abstract algebra; group theory; axiomatic set theory (ZFC); order & lattice theory; ordinal numbers.

#### Proof theory and type theory (2017.1)

4h/week; 60 credits; optional course

Mathematical logic; intuitionistic logic; proof theory; natural deduction; sequent calculus; functional programming; lambda calculus; types in programming languages; type theory; the Curry–Howard isomorphism; the Coq proof assistant.

Further information, exams, and detailed log of classes available at **each course’s website**.<sup>10</sup>

### Lecture notes book

Based on my lecture notes, I have started (on December 2016) writing a **book on foundational mathematics** (in Portuguese). This is a work-in-progress and still on its early stages, but it is already available on my website<sup>11</sup> and its full source code (13,000 LoC) via GitHub.<sup>12</sup> The following chapters have already been used by colleagues:

- Number theory
- Congruences & modular arithmetic
- Combinatorics
- Group theory

To write this book, I have developed **ThaTeX**, a plain TeX macro suite for creating mathematical books, lecture notes, and exams. Its source code (2,000 LoC) is also available on my GitHub.<sup>13</sup>

### Teaching Assistance project

**FMCn (2017)**. I was granted scholarships for two Teaching Assistants for my project “FMCn”, relevant to our department’s required courses FMC1, FMC2, and FMC3 (see above). For more information about the project, you can check its website (in Portuguese).<sup>14</sup>

### Creation/design of undergraduate “reinforcement” courses

#### Precalculus & algebra

4h/week, 60 credits

#### Euclidean geometry

2h/week, 30 credits

#### Trigonometry

2h/week, 30 credits

### Post-graduate courses as a Teaching Assistant

**Set theory (2010)** ..... 16h/week, 80 hours  
Teaching assistant for the split post-graduate and undergraduate course of the MPLA post-graduate program at the Mathematics Department of the UNIVERSITY OF ATHENS. Textbook: *Notes on Set Theory* by Moschovakis.

<sup>9</sup><http://tsouanas.org/teaching/>

<sup>10</sup><http://www.tsouanas.org/teaching/fmc2/2017.1/>

<sup>11</sup><http://www.tsouanas.org/fmcbook/>

<sup>12</sup><http://github.com/tsouanas/fmcbook>

<sup>13</sup><http://github.com/tsouanas/thatex>

<sup>14</sup><http://fmc.imd.ufrn.br/>

## Tutorials, mini-courses & seminars

These, I have prepared and taught since the years of my studies in the University of Athens up until my current years of working as a professor in UFRN, Brazil. The attendants are mostly university students and professors.

**Typesetting correctly with T<sub>E</sub>X/L<sup>A</sup>T<sub>E</sub>X (2017)** ..... 2 days, 8 hours; participants: 30  
Similar to the one below.

**Functional programming with Haskell (2017)**<sup>15</sup> ..... 7 weeks, 2h/week (cotaught); participants: 40  
Similar to the one below.

**Introduction to Unix: tools and philosophy (2016)**<sup>16</sup> ..... 3 days, 9 hours; participants: 13  
Philosophy of Unix, Unix tools, streams and pipes, permissions, shell scripting, the Vim editor.

**Typesetting correctly with T<sub>E</sub>X/L<sup>A</sup>T<sub>E</sub>X (2016)** ..... 2 days, 6 hours; participants: 10  
Similar to the one below.

**Introduction to functional programming with Haskell (2009)** ..... 6 weeks, 2h/week; participants: 30  
The computational model of Haskell; introduction to  $\lambda$ -calculus; types; typeclasses; recursion; higher-order functions; evaluation strategies; I/O; presentation of the early source code of `xmonad`.

**T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X: How to correctly typeset beautiful texts (2006)** .... 3 lectures, 2 hours each; participants: 40  
The focus was on correct (semantical) typesetting for mathematical texts, a presentation of relevant L<sup>A</sup>T<sub>E</sub>X packages and an introduction to programming in T<sub>E</sub>X.

**Open-source: Unix, L<sup>A</sup>T<sub>E</sub>X, Python (2005)** ..... One semester, 2h/week; participants: 40  
The basics of Unix and its philosophy: shell; pipes; permissions; scripting; editing and text processing with Vim. Typesetting with L<sup>A</sup>T<sub>E</sub>X. Introduction to Python: scripts; imperative and object-oriented programming.

**Server-side and client-side programming: PHP & JavaScript (2004)** ... 6 weeks, 2h/week; participants: 30  
A simple web blog application was built along the lectures, to demonstrate the basic principles of web programming, concluding with with a lecture on basic SQL and database interaction.

**Website design with pure, clean and valid HTML (2003)** ..... 6 weeks, 2h/week; participants: 80  
Coding in HTML and CSS; basic principles of how the World Wide Web works and the HTTP protocol. By the end of the mini-course the attendants were using FTP to maintain their personal websites on the department's web server.

## Private lessons & small-group classes

I have given private lessons and small-group classes to university students of the following courses:

**Calculus I & II.** Standard first-year courses of Calculus: real functions, limits, sequences, series, derivatives, integrals. For these I used Spivak's, Hardy's, and Apostol's books extensively.

**Real Analysis.** Metrics and norms, opened and closed sets, continuity, connectedness, completeness and compactness. For these I used Simmons's Topology book and Carothers's Real Analysis book.

**Introduction to set theory and mathematical logic.** Countable and uncountable sets, axioms of ZFC, propositional and predicate calculus, completeness theorems of Gödel.

**Introduction to Computer Science.** Standard entry-level course on programming (using Python or C): I/O; Variables; arithmetic and boolean operators; control flow; arrays; functions. Basic algorithms for sorting, searching, etc.

**Object-oriented programming.** Basic principles of OOP (using Java, Scala, or Ruby): objects and classes; encapsulation; inheritance; polymorphism; etc.

**Functional programming with Haskell.** Types; type classes; higher-order functions; working with lists; list comprehension; recursive functions and data types; I/O.

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<sup>15</sup><http://www.tsouanas.org/teaching/haskell/>

<sup>16</sup><http://www.tsouanas.org/teaching/unix/>

