

Benoît Legat

Curriculum Vitae

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Research experience

- 2021–present **Postdoctoral research**, *Massachusetts Institute of Technology (MIT)*, Boston.
BAEF research fellowship with Prof. Pablo Parrilo.
- 2020–2021 **Postdoctoral research**, *UCLouvain and IBA*, Louvain-la-Neuve.
Research with Prof. Raphaël Jungers and IBA on the BidMed project “Big Data in health care” and then on the ERC project “Learning to control”.
- 2016–2020 **PhD thesis**, *UCLouvain*, Louvain-la-Neuve.
Phd thesis “Set Programming: Theory and Computation” with Prof. Raphaël Jungers and Prof. Pablo Parrilo.
- 2016 **Master’s thesis**, *UCLouvain*, Louvain-la-Neuve.
Master’s thesis “Sum-Of-Squares programming on Path-complete graphs for switching systems” with Prof. Raphaël Jungers.
- 2015 **Summer Internship**, *Massachusetts Institute of Technology (MIT)*, Boston.
Research with Prof. Pablo Parrilo.
- 2014 **Summer Internship**, *Université de Liège*, Liège.
Signal processing applied to H-NMR pretreatments in Metabolomics for data-driven health care.
- 2011 **Summer Internship**, *Keemotion*, Louvain-la-Neuve.
Real-time image processing for camera control of basketball.

Education

- 2016–2020 **Ph.D. Degree in Applied Mathematics**, *F.R.S.-FNRS Research Fellow, UCLouvain*, Louvain-la-Neuve, *supervised by Raphaël Jungers and Pablo Parrilo (MIT)*.
Thesis title: “Set Programming: Theory and Computation”
- 2014–2016 **Master’s Degree in Applied Mathematics**, *UCLouvain*, Louvain-la-Neuve, *Summa Cum Laude*.
Thesis title: “Sum-Of-Squares programming on Path-complete graphs for switching systems”
- 2011–2014 **Bachelor’s Degree in Engineering**, *UCLouvain*, Louvain-la-Neuve, *Summa Cum Laude*.
Specialized in Computer Science and Mathematics
- 2005–2011 **Secondary education**, *Lycée Martin V*, Louvain-la-Neuve.
Specialized in Science and Mathematics

Massive Open Online Courses

- 2020 **ALL001.1x: Introduction à la philosophie de Friedrich Nietzsche**, *SorbonneX*, grade A.
- 2014 **Coursera: Cryptography I**, *Stanford University*, grade A.
- 2014 **LFS101x: Introduction to Linux**, *LinuxFoundationX*, grade A.

- 2014 **UT.9.01x: Effective Thinking Through Mathematics**, *UTAustinX*, grade A.
- 2014 **Astro2290x: Relativity and Astrophysics**, *CornellX*, grade A.
- 2013 **CS184.1x: Foundations of Computer Graphics**, *BerkeleyX*, C.
- 2013 **CS191x: Quantum Mechanics and Quantum Computation**, *BerkeleyX*, grade A.
- 2012 **CS188.1x: Artificial Intelligence**, *BerkeleyX*, grade A.
- 2012 **6.002x: Circuits and Electronics**, *MITx*, grade A.

Teaching experience

- 2016–2020 **Teaching Assistant**, *UCLouvain*, Louvain-la-Neuve.
Game theory (LINMA2345), Modelling and analysis of dynamical systems (LINMA2370), Advanced control and applications (LINMA2671), Scientific computing (LINMA2710)
- 2016–2018 **Computer Science Instructor**, *ACM International Collegiate Programming Contest (ICPC)*, Louvain-la-Neuve.
Training of UCLouvain students for the ACM ICPC after representing UCLouvain from 2013 to 2015.
- 2015 **Teaching Assistant**, *UCLouvain*, Louvain-la-Neuve.
Organization and grading of the UCL Algorithm Contest (UAC) for Algorithmics and data structures (LSINF1121).
- 2013–Present **Online Instructor**, *Mathraining*.
Development with Dr. Nicolas Radu of the Mathraining online platform to help secondary students in their training for the International Mathematical Olympiad.
- 2013–Present **Mathematics Instructor**, *Belgium Society of Mathematics Professors*, La Marlagne.
Training of secondary school students for the International Mathematical Olympiad.
- 2013–2018 **Computer Science Instructor**, *beOI: Belgium Olympiad in Informatics*.
Training of secondary school students in Algorithms and Competitive Programming for the International Olympiad in Informatics.
- 2012–2016 **Academic Tutor**, *UCLouvain*, Louvain-la-Neuve.
Coaching of first years student for the two first Mathematics courses (LFSAB1101 and LFSAB1102) and for the first Physics course (LFSAB1201). I gave exercises classes and corrected homeworks for students in second year twice for the course LFSAB1104 (numerical methods), twice for the course LSINF1252 (Operating Systems) and once for the course LINMA1702 (Optimization models and methods).
- 2014 **Student job**, *UCLouvain*, Louvain-la-Neuve.
Introduction of high school students to Artificial Intelligence.
- 2013 **Summer student job**, *UCLouvain*, Louvain-la-Neuve.
Development of benchmarking exercises to mesure differences in system calls performances and a part of the syllabus about Git for the course LSINF1252.

Reviewing experience

- 2018–Present **Reviewer**, *Society for Industrial and Applied Mathematics (SIAM)*.
Journal on Control and Optimization (SICON), Journal on Optimization (SIOPT)
- 2018–Present **Reviewer**, *International Federation of Automatic Control (IFAC)*.
Automatica, Nonlinear Analysis: Hybrid Systems (NAHS)

- 2017–Present **Reviewer**, *Institute of Electrical and Electronics Engineers (IEEE)*.
Transactions on Automatic Control (TAC), Control Systems Letters (L-CSS), American Control Conference (ACC), Conference on Decision and Control (CDC)
- 2012 **Jury member**, *Belgium Society of Mathematics Professors*, La Marlagne.
Grading of solutions for participants to the Benelux Mathematical Olympiad 2012.

Research visits

- 2021–present **12 months**, *Laboratory for Information & Decision Systems*, Massachusetts Institute of Technology, USA.
- 2019 **1 week**, *Advanced Network Science Initiative*, Los Alamos National Laboratory, USA.
- 2018 **< 1 week**, *CERMICS*, Ecole des Ponts ParisTech, France.
- 2018 **< 1 week**, *Modelling, Simulation and Design Lab*, Antwerpen University, Belgium.
- 2017 **< 1 week**, *CERMICS*, Ecole des Ponts ParisTech, France.
- 2017 **2 weeks**, *Laboratory for Information & Decision Systems*, Massachusetts Institute of Technology, USA.
- 2017 **1 week**, *Cyber-Physical Systems Laboratory*, University of California at Los Angeles, USA.
- 2017 **< 1 week**, *Modelling, Simulation and Design Lab*, Antwerpen University, Belgium.
- 2016 **1 week**, *Mathematics Department*, University of Surrey, United Kingdom.
- 2016 **1 week**, *Faculty of Electrical Engineering*, Czech Technical University in Prague, Czech Republic.
- 2016 **2 weeks**, *Laboratory for Information & Decision Systems*, Massachusetts Institute of Technology, USA.
- 2015 **2 months**, *Laboratory for Information & Decision Systems*, Massachusetts Institute of Technology, USA.

Organization of scientific events

- 2020 **Local organizer**, *The Fourth Annual JuMP-dev Workshop*, UCLouvain.
Cancelled due to COVID-19 pandemic.
- 2019 **Program committee member**, *The Third Annual JuMP-dev Workshop*, Santiago, Chile.
- 2018 **Program committee member**, *The Second Annual JuMP-dev Workshop*, University of Bordeaux.
- 2017 **Program committee member**, *The First Annual JuMP-dev Workshop*, Sloan School of Business, Massachusetts Institute of Technology.

Invited speaker

- 2020 **INFORMS Annual Meeting**, Online.
- 2020 **INFORMS Annual Meeting**, Online.
- 2019 **Petit Déj' de l'I&D**, N-SIDE, Belgium.

- 2019 **Berlin Julia Users Group.**
- 2019 **ICCOPT**, Technical University of Berlin, Germany.
- 2019 **juliaday Nantes**, *Laboratoire des Sciences du Numérique de Nantes*, Nantes University, France.
- 2019 **European Conference in Operational Research**, University College Dublin, Ireland.
- 2018 **Summer School on Numerical Computing in Algebraic Geometry**, *Max-Planck Institute*, Leipzig University, Germany.
- 2018 **23rd International Symposium on Mathematical Programming**, University of Bordeaux, France.
- 2018 **Seminar**, *Modelling, Simulation and Design Lab*, Antwerpen University, Belgium.

Supervising experience

- 2020–Present **Ph.D. thesis co-supervisor**, *Julien Calbert*, UCLouvain.
Beyond the Linear Matrix Inequality framework for the control of Cyber-Physical Systems.
- 2020 **Mentor**, *Akshay Sharma*, Google Summer of Code, Indian Institute of Technology (Banaras Hindu University), Varanasi.
Differentiating convex optimization program with respect to program parameters.
- 2020 **Mentor**, *Tomás Gutierrez*, Google Summer of Code, LAMPS PUC-Rio.
Parametric optimization.
- 2019 **Mentor**, *Guilherme Bodin*, Google Summer of Code, LAMPS PUC-Rio.
JuMP automatic dualization.
- 2019 **Mentor**, *Gilles Peiffer*, Google Summer of Code, UCLouvain.
MutableArithmetics.jl: Bringing optimized operations to Julia.
- 2018–2019 **Master thesis advisor**, *Jean Bouchat*, UCLouvain, now Ph.D. student in the Earth and Life Institute.
Reinforcement learning for the optimal control of hybrid systems.

Awards

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| 2015 | Bronze Medal at NWERC¹ 2015 | <i>Leiden, Netherlands</i> |
| 2015 | 3rd team at BAPC² 2015 | <i>Eindhoven, Netherlands</i> |
| 2015 | 5th team at Cyber Security Challenge 2015 | <i>Brussels, Belgium</i> |
| 2014 | Bronze Medal at NWERC¹ 2014 | <i>Linköping, Sweden</i> |
| 2014 | 3rd team at BAPC² 2014 | <i>Eindhoven, Netherlands</i> |
| 2013 | 4th team at BAPC² 2013 | <i>Utrecht, Netherlands</i> |
| 2012 | 2nd at Prologin 2012 final | <i>Paris, France</i> |
| 2011 | Bronze Medal at IOI³ 2011 | <i>Pattaya, Thailand</i> |
| 2011 | Bronze Medal at IMO⁴ 2011 | <i>Amsterdam, Netherlands</i> |
| 2011 | 1st prize at OMB⁵ 2011 | <i>Brussels, Belgium</i> |
| 2011 | Bronze medal at BxMO⁶ 2011 | <i>Mersch, Luxembourg</i> |

2011	1st at be-OI⁷ 2011	<i>Louvain-la-Neuve, Belgium</i>
2010	1st Belgian at IOI³ 2010	<i>Waterloo, Canada</i>
2010	3rd at be-OI⁷ 2010	<i>Louvain-la-Neuve, Belgium</i>
2010	Bronze medal at BxMO⁶ 2010	<i>Amsterdam, Netherlands</i>
2009	4th prize at OMB⁵ 2009	<i>Brussels, Belgium</i>

¹ACM ICPC Northwestern Europe Regional Contest

²ACM ICPC Benelux Algorithm Programming Contest

³International Olympiad in Informatics

⁴International Mathematical Olympiad

⁵Olymiade Mathématique Belge (Belgian Mathematical Olympiad)

⁶Benelux Mathematical Olympiad

⁷Belgian Olympiad in Informatics