Benoît Legat

Curriculum Vitae

15 Marney Street Apt 2
Cambridge MA 02141, USA
+1 (857) 333-8381
blegat@mit.edu
blegat.github.io

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

2022 **Lecturer**, *Cambridge Centre for International Research*, Cambridge.
Mixed-Integer Linear Programming

2022 **Instructor**, *MIT*, Boston.
6.S098, IAP 2022 – Applied Convex Optimization

2021 **Kaufman Teaching Certificate Program (KTCP)**, *MIT Teaching and Learning Lab*, Boston.

2021 **Teaching Assistant**, *MIT*, Boston.
6.256/18.456 - Algebraic techniques and semidefinite programming

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 Algorithms and data structures (LSINF1121).

2013–Present **Online Intructor**, *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 year students for the two first Mathematics courses (LFSAB1101 and LFSAB1102) and for the first Physics course (LFSAB1201). I gave exercise 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 measure differences in system calls performances and a part of the syllabus about Git for the course LSINF1252.

Reviewing experience

2021–Present **Reviewer**, *Open Journals*.
JuliaCon Conference (JCon)

2021–Present **Reviewer**, *Taylor & Francis*.
International Journal of Control (TCon)

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), Conference on Analysis and Design of Hybrid Systems (ADHS)

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), Basil Papadias Award

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

2022 **Program committee member**, *JuMP-dev 2022*.

2022 **Program committee member**, *25th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, Milan, Italy, Repeatability Evaluation.

2022 **Cluster Chair**, *17th INFORMS Computing Society Conference 2022*, Tamba, Florida, USA.

2021 **Program committee member**, *24th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)*, Virtual, Repeatability Evaluation.

2021 **Program committee member**, *JuMP-dev 2021*, Virtual.

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

2022 **TraDE-OPT Workshop on Algorithmic and Continuous Optimization**, UCLouvain, Belgium.

2022 **7th International Conference on Continuous Optimization (ICCOPT)**, Bethlehem, Pennsylvania, USA.

2021 **INFORMS Annual Meeting**, Anaheim, California, USA.

2021 **2nd POEMA Learning Week**, Toulouse, France.

2021 **18th European Conference in Operational Research (EUROPT)**, Fully virtual.

2020 **INFORMS Annual Meeting**, Fully virtual.

2020 **INFORMS Annual Meeting**, Fully virtual.

2019 **Petit Déj' de l'I&D**, N-SIDE, Belgium.

2019 **Berlin Julia Users Group**.

2019 **6th International Conference on Continuous Optimization (ICCOPT)**, Technical University of Berlin, Germany.

2019 **17th European Conference in Operational Research (EUROPT)**, University College Dublin, Ireland.

2019 **juliaday Nantes**, *Laboratoire des Sciences du Numérique de Nantes*, Nantes University, France.

2018 **Summer School on Numerical Computing in Algebraic Geometry**, *Max-Planck Institute*, Leipzig University, Germany.

2018 **23rd International Symposium on Mathematical Programming (ISMP)**, 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

2015 **Bronze Medal at NWERC[1] 2015** *Leiden, Netherlands*

2015 **3rd team at BAPC[2] 2015** *Eindhoven, Netherlands*

2015 **5th team at Cyber Security Challenge 2015** *Brussels, Belgium*

2014 **Bronze Medal at NWERC[1] 2014** *Linköping, Sweden*

2014 **3rd team at BAPC[2] 2014** *Eindhoven, Netherlands*

2013 **4th team at BAPC[2] 2013** *Utrecht, Netherlands*

2012 **2nd at Prologin 2012 final** *Paris, France*

2011 **Bronze Medal at IOI[3] 2011** *Pattaya, Thaïland*

2011 **Bronze Medal at IMO[4] 2011** *Amsterdam, Netherlands*

2011 **1st prize at OMB[5] 2011** *Brussels, Belgium*

2011 **Bronze medal at BxMO[6] 2011** *Mersch, Luxembourg*

2011 **1st at be-OI[7] 2011** *Louvain-la-Neuve, Belgium*

2010 **1st Belgian at IOI[3] 2010** *Waterloo, Canada*

2010 **3rd at be-OI[7] 2010** *Louvain-la-Neuve, Belgium*

2010 **Bronze medal at BxMO[6] 2010** *Amsterdan, Netherlands*

2009 **4th prize at OMB[5] 2009** *Brussels, Belgium*

[1]ACM ICPC Northwestern Europe Regional Contest
[2]ACM ICPC Benelux Algorithm Programming Contest
[3]International Olympiad in Informatics
[4]International Mathematical Olympiad
[5]Olymiade Mathématique Belge (Belgian Mathematical Olympiad)
[6]Benelux Mathematical Olympiad
[7]Belgian Olympiad in Informatics