

# CURRICULUM VITAE OF CHRISTIAN BLUM

Last updated: September 2011

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## PERSONAL INFORMATION

**Birth date and place** April 20, 1972. Annweiler, Germany  
**Nationality** German  
**Title** Dr. Dipl.-Math.

**Desk address** ALBCOM research group  
Universitat Politècnica de Catalunya  
Jordi Girona 1-3, Omega 112, Campus Nord  
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## MAIN SCIENTIFIC MEASURES (BASED ON GOOGLE SCHOLAR, JUNE 2011)

**h-index** 20  
**g-index** 52  
**Total number of citations** 2792

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## LATEST NEWS

- September 2011: I was invited to act as **editor-in-chief** of *GECCO 2013*, one of the two largest conferences in the field of *Evolutionary Computation*.
- September 2011: I was invited to be **program co-chair** of *ANTS 2012* in Brussels, Belgium
- In September 2010 I received the **Theoretical Computer Science Top Cited Paper 2005–2010 Award** (given by Elsevier)
- In May 2010 I gave an **invited keynote talk** on *Hybrid Metaheuristics* at BIOMA 2010: Bio-inspired Optimization Methods and their Applications (Ljubljana, Slovenia)
- March 2010: I was appointed as a member of the **scientific advisory board** of the company *Reactive Search S.r.l.*

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## RESEARCH INTERESTS

My research interests are twofold: On one side I am interested in **swarm intelligence**, which is an artificial intelligence discipline based on the inspiration taken, for example, from the collective behaviour of social insects, flocks of birds, and fish schools. On the other side I am also interested in the **hybridization of metaheuristics** with more classical artificial intelligence and operations research methods such as, for example, branch & bound techniques and dynamic programming.

I make use of swarm intelligence concepts both for solving challenging combinatorial optimization problems and for problem solving in distributed environments such as adhoc and sensor networks. Well-known swarm intelligence algorithms for combinatorial optimization are ant colony optimization (ACO) and particle swarm optimization (PSO). In distributed environments I have lately made use of the self-organization of natural ant colonies for obtaining synchronized sleep-wake periods, and the self-desynchronization of the calling periods of Japanese tree frogs. Concerning the second research line, I am currently working mainly on two different types of hybridization. First, the hybridization of metaheuristics based on the construction of solutions with concepts from branch & bound. Second, I am working on the development of efficient large neighborhood search algorithms.

Concerning applications, my work has a **strong interdisciplinary flavour**. In fact, optimization and control tasks arise in many important application areas such as telecommunications, bio-informatics, neuroscience, and robotics. A representative example of recent interdisciplinary work concerns the collaboration with the EPFL (Lausanne, Switzerland) on the *automated reconstruction of dendritic and axonal trees* (for more information see <http://cvlab.epfl.ch/research/medical/lm/>). Concerning the bio-informatics (respectively, bio-medical) field, some of my recent work has focused on *DNA sequencing*, the *training of neural networks for medical pattern classification*, and on the *founder sequence reconstruction problem*.

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## EDUCATION

02/2004

### **PhD in Applied Sciences**

*Institution:* Université Libre de Bruxelles, Brussels, Belgium

*Dissertation title:* Theoretical and practical aspects of ant colony optimization

*Supervisor:* Prof. M. Dorigo

05/2002

### **DEA in Applied Sciences**

(Belgian Diplôme d'Etudes Approfondies en Sciences Appliquées)

*Institution:* Université Libre de Bruxelles, Brussels, Belgium

*Dissertation title:* Metaheuristics for group shop scheduling

*Supervisor:* Prof. M. Dorigo

- 07/1998      **Diplom in Mathematik**  
(German equivalent to a Masters degree in Mathematics)
- Institution:* Universität Kaiserslautern, Kaiserslautern, Germany  
*Dissertation title:* Optimality criteria and local search methods for node-weighted  $k$ -cardinality tree and subgraph problems (in German)  
*Supervisor:* Prof. H. W. Hamacher
- 10/1994      **Vordiplom in Mathematik**  
(degree necessary to obtain a diploma)
- Institution:* Johannes-Gutenberg Universität Mainz, Mainz, Germany
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## RESEARCH EXPERIENCE

- From 12/2006      **Tenure Track Research Fellow**
- Institution:* LSI, Universitat Politècnica de Catalunya, Barcelona, Spain  
*Funding:* Programa **Ramon y Cajal**, a program of the Spanish Ministry of Science and Technology
- 12/2004–11/2006      **Post-doctoral Research Fellow**
- Institution:* LSI, Universitat Politècnica de Catalunya, Barcelona, Spain  
*Funding:* Programa **Juan de la Cierva**, a program of the Spanish Ministry of Science and Technology  
*Remark:* 1st place in the list of evaluated applications
- 07/2004–11/2004      **Post-doctoral Researcher**
- Institution:* LSI, Universitat Politècnica de Catalunya, Barcelona, Spain  
*Funding:* Project “SegraVis”, a research training network funded by the European Commission
- 02/2004–06/2004      **Post-doctoral Researcher**
- Institution:* IRIDIA, Université Libre de Bruxelles, Brussels, Belgium  
*Funding:* Project “Metaheuristics Network”, a research training network funded by the European Commission

- 11/2000–01/2004    **Pre-doctoral Researcher**
- Institution:* IRIDIA, Université Libre de Bruxelles, Brussels, Belgium  
*Funding:* Project “Metaheuristics Network”, a research training network funded by the European Commission
- 10/1997–04/1998    **Scientific Assistant**
- Institution:* Working group of Prof. H. W. Hamacher, Universität Kaiserslautern, Kaiserslautern, Germany
- 04/1997–06/1997    **Scientific Assistant**
- Institution:* DFKI (German Research Institute for Artificial Intelligence), Kaiserslautern, Germany  
*Funding:* German project ”PRODUKTION 2000, GIPP-S1”
- 01/1996–04/1997    **Scientific Assistant**
- Institution:* Centre for Learning Systems and Applications, Kaiserslautern, Germany  
*Funding:* Project “Diagnosis and monitoring of ulnar nerve lesions”
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#### PROFESSIONAL EXPERIENCE

- 10/1999–09/2000    **Scientific Officer**
- Institution:* Imperial Cancer Research Fund (ICRF), Advanced Computation Laboratory, London, United Kingdom  
*Task:* Interfacing of a clinical decision support system with an electronic patient record systems
- 03/1995–04/1995    **Practical Training**
- Company:* BASF AG, Department of Molecular Modelling, Ludwigshafen, Germany  
*Task:* Development of optimization software for the determination of molecule structures

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## AWARDS

- 08/2010      **Theoretical Computer Science Top Cited Article 2005–2010 Award**, given to the most cited paper published in the journal *Theoretical Computer Science (Elsevier)* between 2005 and 2010.
- 06/2007      **IEEE Transactions on Evolutionary Computation Outstanding Paper Award 2005 (bestowed in 2007)**, given to the best paper published in the journal *IEEE Transactions on Evolutionary Computation* in 2005. Prize money: 1000 US dollars.
- 07/2006      **GECCO 2006 Best Paper Award** for the best paper presented in the *ECO track (Evolutionary Combinatorial Optimization)* of the Genetic and Evolutionary Computation (GECCO) conference.
- 12/2003      The paper *Local search algorithms for the k-cardinality tree problem* published in the journal *Discrete Applied Mathematics* was selected for the **Editors' choice volume of 2003**.

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## APPEARANCE IN THE MEDIA

- 02/2009      An **interview on swarm intelligence** was broadcasted as part of the popular science program *Tres14* by the Spanish channel TVE2 (<http://www.rtve.es/alacarta/videos/tres14/tres14-hormigas-en-la-red/458567/>).

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## RESEARCH PROJECTS AS SCIENTIST IN CHARGE

- Since 2009      Integrated action grant **AI-ES-AT**, contract MEC HA2008-0005  
Funding: 11.950 Euros

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## OTHER RESEARCH PROJECTS

- Since 2008      MICINN 6-year macro-project **FORMALISM**, contract TIN-2007-66523  
*Scientist in charge*: Fernando Orejas (UPC, Barcelona)  
Funding: 821.000 Euros

- Since 2008 EU-funded project **FRONTS**, contract EU FP7-ICT-2007-1  
*Scientist in charge:* Josep Diaz (UPC, Barcelona)
- Since 2008 EU-funded project **WISEBED**, contract EU FP7-ICT-2007-1  
*Scientist in charge:* Josep Diaz (UPC, Barcelona)
- Since 2006 CICYT project **OPLINK**, contract TIN-2005-08818-C04  
*Scientist in charge:* Enrique Alba Torres (UMA, Málaga)
- 07/2004–11/2005 CICYT project **TRACER**, contract TIC-2002-04498-C05  
*Scientist in charge:* Joaquim Gabarró (UPC, Barcelona)
- 07/2004–11/2004 EU-funded research training network **SegraVis**,  
contract HPRN-CT-2002-00275  
*Scientist in charge:* Fernando Orejas (UPC, Barcelona)
- 11/2000–06/2004 EU-funded research training network **Metaheuristics Network**,  
contract HPRN-CT-1999-00106  
*Scientist in charge:* Marco Dorigo (ULB, Belgium)
- 04/1997–06/1997 German project **PRODUKTION 2000, GIPP-S1**,  
contract FKZ-02PV41092  
*Scientist in charge:* Harold Boley (DFKI GmbH, Germany)

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#### SCIENTIFIC BOARDS AND STEERING COMMITTEES

- Since 01/2010 **Member of the Steering Committee** of the LION international conference series
- Since 03/2010 **Member of the Scientific Advisory Board** of the company Reactive Search S.r.l.

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#### EDITORIAL ACTIVITIES

- Since 03/2011 **Field Editor for Swarm Intelligence** for a large book project on computational intelligence by Springer Verlag, Berlin, Germany
- 10/2010 **Co-editor** of the proceedings of Hybrid Metaheuristics (HM) 2010 (LNCS 6373)

- 03/2010      **Co-editor** of a special issue on “Hybrid Metaheuristics” in the journal *Computers & Operations Research* (vol 37, issue 3, 2010)
- 01/2010      **Co-editor** of the proceedings of Learning and Intelligent Optimization (LION) 2010 (LNCS 6073)
- 10/2009      **Co-editor** of the proceedings of Hybrid Metaheuristics (HM) 2009 (LNCS 5818)
- 07/2009      **Co-editor** of the proceedings of the 2009 Genetic and Evolutionary Computation Conference (GECCO 2009), published by ACM press
- 10/2008      **Co-editor** of the proceedings of Hybrid Metaheuristics (HM) 2008 (LNCS 5296)
- 09/2008      **Co-editor** of the proceedings of ANTS 2008: Sixth International Workshop on Ant Colony Optimization and Swarm Intelligence (LNCS)
- 09/2008      **Co-editor** of the book *Swarm Intelligence–Introduction and Applications* published by Springer Verlag
- 05/2008      **Co-editor** of the book *Hybrid Metaheuristics–An Emerging Approach to Optimization* published by Springer Verlag
- 10/2007      **Co-editor** of the proceedings of Hybrid Metaheuristics (HM) 2007 (LNCS 4771)
- Since 12/2006      **Associate editor** of the *Swarm Intelligence* journal (Springer)
- 10/2006      **Co-editor** of the proceedings of Hybrid Metaheuristics (HM) 2006 (LNCS 4030)
- Since 07/2006      **Member of the editorial board** of the *International Journal of Innovative Computing and Applications* (IJICA)
- 07/2006      **Co-editor** of the proceedings of the 2006 Genetic and Evolutionary Computation Conference (GECCO 2006), published by ACM press
- 04/2006      **Co-editor** of a special issue on “Hybrid Metaheuristics” in the *Journal of Mathematical Modelling and Algorithms* (vol 5, issue 1, 2006)
- Since 02/2006      **Member of the editorial board** of the ISE book series on *Intelligent System Engineering* (by NOVA publishers, NY, USA)

12/2005	<b>Co-editor</b> of a special issue on “Swarm Intelligence” in the journal Künstliche Intelligenz, the journal of the AI section of the German Society for Informatics (vol 4, 2005)
08/2005	<b>Co-editor</b> of the proceedings of Hybrid Metaheuristics (HM) 2005 (LNCS 3636)
Since 08/2005	<b>Member of the editorial board</b> of the journal Computers & Operations Research (Elsevier)
06/2005	<b>Co-editor</b> of the proceedings of the 2005 Genetic and Evolutionary Computation Conference (GECCO 2005), published by ACM press.
09/2004	<b>Co-editor</b> of the proceedings of ANTS 2004: Fourth International Workshop on Ant Algorithms (LNCS 3172)
08/2004	<b>Co-editor</b> of the proceedings of Hybrid Metaheuristics (HM 2004) (ISBN 3-00-015331-4)

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#### ORGANIZATIONAL ACTIVITIES

07/2011	<b>Co-chair</b> of the 1st International Workshop on Bio-inspired Solutions for Wireless Sensor Networks, (Dublin, Ireland)
10/2010	<b>Program co-chair</b> of the 7th International Workshop on Hybrid Metaheuristics (HM 2010), (Vienna, Austria)
01/2010	<b>Chair of the Program Committee</b> of Learning and Intelligent Optimization (LION 4), (Venice, Italy)
10/2009	<b>Program co-chair</b> of the 6th International Workshop on Hybrid Metaheuristics (HM 2009), (Udine, Italy)
07/2009	<b>Co-chair</b> of the “Combinatorial Optimization” track of GECCO 2009: Genetic and Evolutionary Computation Conference (Montreal, Canada)
10/2008	<b>Program co-chair</b> of the 5th International Workshop on Hybrid Metaheuristics (HM 2008), (Málaga, Spain)
09/2008	<b>Program co-chair</b> of the Sixth International Conference on Ant Colony Optimization and Swarm Intelligence (ANTS 2008), (Brussels, Belgium)
10/2007	<b>Program co-chair</b> of the 4th International Workshop on Hybrid Metaheuristics (HM 2007), (Dortmund, Germany)

- 02/2007      **Organizer** of a special session on *hybrid metaheuristics* at the Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB 2007), (Tenerife, Spain)
- 10/2006      **Co-organizer** of the 3rd international workshop on Hybrid Metaheuristics (HM 2006), (Gran Canaria, Spain)
- 07/2006      **Chair** of the “ACO”/“swarm intelligence” track of GECCO 2006: Genetic and Evolutionary Computation Conference (Seattle, USA)
- 08/2005      **Co-organizer** of the 2nd international workshop on Hybrid Metaheuristics (HM 2005), (Barcelona, Spain)
- 06/2005      **Chair** of the “ACO”/“swarm intelligence” track of GECCO 2005: Genetic and Evolutionary Computation Conference (Washington, USA)
- 09/2004      **Publication co-chair** of ANTS 2004: Fourth International Workshop on Ant Algorithms (Brussels, Belgium)
- 08/2004      **Co-organizer** of the workshop Hybrid Metaheuristics (HM 2004) at ECAI 2004 (Valencia, Spain)
- 09/2002      **Member** of the *Local Organizations Committee* of ANTS 2002: 3rd International Workshop on Ant Algorithms (Brussels, Belgium)

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#### PROGRAM COMMITTEES

- 11/2011      **Member** of the *Program Committee* of EMERGING 2011: The Third International Conference on Emerging Network Intelligence (Lisbon, Portugal)
- 11/2011      **Member** of the *Program Committee* of MEDES 2011: The 3rd International Conference on Management of Emergent Digital EcoSystems (San Francisco, USA)
- 11/2011      **Member** of the *Program Committee* of CAEPIA 2011: Conferencia de la Asociación Española para la Inteligencia Artificial (La Laguna, Spain)
- 10/2011      **Member** of the *Program Committee* of ECTA 2011: International Conference on Evolutionary Computation Theory and Applications (Paris, France)

- 07/2011 **Member** of the *Program Committee* of HEUNET 2011: 2nd Workshop on Heuristic Methods for the Design, Deployment, and Reliability of Networks and Network Applications (Munich, Germany)
- 07/2011 **Member** of the *Program Committee* of ICINCO 2011: 8th International Conference on Informatics in Control, Automation and Robotics (Noordwijkerhout, The Netherlands)
- 07/2011 **Member** of the *Program Committee* of GECCO 2011: Genetic and Evolutionary Computation Conference (Dublin, Ireland)
- 07/2011 **Member** of the *Program Committee* of MIC 2011: 9th Metaheuristics International Conference (Udine, Italy)
- 06/2011 **Member** of the *Program Committee* of ICSI 2011: 2th International Conference on Swarm Intelligence (Chongqing, China)
- 05/2011 **Member** of the *Program Committee* of OptMas 2011: Fourth International Workshop on Optimisation in Multi-Agent Systems (Taipei, Taiwan)
- 04/2011 **Member** of the *Program Committee* of EvoCOP 2011: 11th European Conference on Evolutionary Computation in Combinatorial Optimisation (Torino, Italy)
- 01/2011 **Member** of the *Program Committee* of LION 5: The 5th International Conference on Learning and Intelligent Optimization (Rome, Italy)
- 11/2010 **Member** of the *Program Committee* of ITBI 2010: 2nd International Conference on IT & Business Intelligence (Nagpur, India)
- 10/2010 **Member** of the *Program Committee* of EMERGING 2010: The Second International Conference on Emerging Network Intelligence (Florence, Italy)
- 10/2010 **Member** of the *Program Committee* of ICEC 2010: International Conference on Evolutionary Computation (Valencia, Spain)
- 10/2010 **Member** of the *Program Committee* of MEDES 2010: The 2nd International Conference on Management of Emergent Digital EcoSystems (Bangkok Thailand)
- 10/2010 **Member** of the *Program Committee* of META 2010: International Conference on Metaheuristics and Nature Inspired Computing (Djerba Island, Tunisia)

- 09/2010 **Member** of the *Program Committee* of MAEB 2010: VII Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (Valencia, Spain)
- 09/2010 **Member** of the *Program Committee* of PPSN 2010: Eleventh International Conference on Parallel Problem Solving From Nature (Krakow, Poland)
- 09/2010 **Member** of the *Program Committee* of ANTS 2010: Seventh International Conference on Swarm Intelligence (Brussels, Belgium)
- 08/2010 **Member** of the *Program Committee* of HIS 2010: 9th International Conference on Hybrid Intelligent Systems (Atlanta, USA)
- 08/2010 **Member** of the *Program Committee* of Alife XII: 12th International Conference on the Synthesis and Simulation of Living Systems (Odense, Denmark)
- 07/2010 **Member** of the *Program Committee* of GECCO 2010: Genetic and Evolutionary Computation Conference (Portland, USA)
- 06/2010 **Member** of the *Program Committee* of ICINCO 2010: 7th International Conference on Informatics in Control, Automation and Robotics (Funchal, Portugal)
- 06/2010 **Member** of the *Program Committee* of ICSI 2010: International Conference on Swarm Intelligence (Beijing, China)
- 05/2010 **Member** of the *Program Committee* of OptMas 2010: Third International Workshop on Optimisation in Multi-Agent Systems (Toronto, Canada)
- 05/2010 **Member** of the *Program Committee* of BIOMA 2010: The 4th International Conference on Bioinspired Optimization Methods and their Applications (Ljubljana, Slovenia)
- 04/2010 **Member** of the *Program Committee* of EvoTRANSLOG 2010: 2nd International Workshop on Evolutionary Computation in Logistics (Istanbul, Turkey)
- 03/2010 **Member** of the *Program Committee* of BIOTECH 2010: The Second International Conference on Advances in Biotechnologies (Cancun, Mexico)
- 11/2009 **Member** of the *Program Committee* of CAEPIA-TTIA 2009: 13th Conference of the Spanish Association of Artificial Intelligence (Seville, Spain)

- 10/2009      **Member** of the *Program Committee* of ICEC 2009: International Conference on Evolutionary Computation (Madeira, Portugal)
- 10/2009      **Member** of the *Program Committee* of EMERGING 2009: First International Conference on Emerging Network Intelligence (Sliema, Malta)
- 10/2009      **Member** of the *Program Committee* of MEDES 2009: The International ACM Conference on Management of Emergent Digital EcoSystems (Lyon, France)
- 09/2009      **Member** of the *Program Committee* of SLS 2009: 2nd International Workshop on Engineering Stochastic Local Search Algorithms (Brussels, Belgium)
- 05/2009      **Member** of the *Program Committee* of CEC 2009: IEEE Congress on Evolutionary Computation (Trondheim, Norway)
- 04/2009      **Member** of the *Program Committee* of EvoCOP 2009: 9th European Conference on Evolutionary Computation in Combinatorial Optimization (Tübingen, Germany)
- 03/2009      **Member** of the *Program Committee* of SIS 2009: IEEE Symposium on Swarm Intelligence (Nashville, USA)
- 02/2009      **Member** of the *Program Committee* of MAEB 2009: VI Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (Malaga, Spain)
- 01/2009      **Member** of the *Program Committee* of LION 3: Intelligent Learning and Optimization (Trento, Italy)
- 11/2008      **Member** of the *Program Committee* of ISDA 2008: International Conference on Intelligent Systems Design and Applications (Kachsiung, Taiwan)
- 10/2008      **Member** of the *Program Committee* of CSTST 2008: Fifth International Conference on Soft Computing as Transdisciplinary Science and Technology (Paris, France)
- 10/2008      **Member** of the *Program Committee* of META 2008: 2nd International Conference on Metaheuristics and Nature Inspired Computing (Hammamet, Tunisia)
- 09/2008      **Member** of the *Program Committee* of ANTS 2008: Sixth International Conference on Ant Colony Optimization and Swarm Intelligence (Brussels, Belgium)

- 09/2008      **Member** of the *Program Committee* of PPSN 2008: International Conference on Parallel Processing in Nature (Dortmund, Germany)
- 07/2008      **Member** of the *Program Committee* of GWAL 2008: 8th German Workshop on Artificial Life (Leipzig, Germany)
- 07/2008      **Member** of the *Program Committee* of HEUNET 2008: Workshop on Heuristic Methods for the Design, Deployment, and Reliability of Networks and Network Applications (Turku, Finland)
- 07/2008      **Member** of the *Program Committee* of GECCO 2008: Genetic and Evolutionary Computation Conference (Atlanta, USA)
- 04/2008      **Member** of the *Program Committee* of EvoCOP 2008: 7th European Conference on Evolutionary Computation in Combinatorial Optimization (Naples, Italy)
- 10/2007      **Member** of the *Program Committee* of WSC12: 12th Online World Conference on Soft Computing in Industrial Applications (World Wide Web)
- 10/2007      **Member** of the *Program Committee* of ISDA 2007: International Conference on Intelligent Systems Design and Applications (Rio de Janeiro, Brasil)
- 09/2007      **Member** of the *Program Committee* of CEC 2007: IEEE Congress on Evolutionary Computation (Singapore, Malaysia)
- 09/2007      **Member** of the *Program Committee* of SLS 2007: International Workshop on Stochastic Local Search (London, UK)
- 07/2007      **Member** of the *Program Committee* of GECCO 2007: Genetic and Evolutionary Computation Conference (London, UK)
- 04/2007      **Member** of the *Program Committee* of EvoCOP 2007: 6th European Conference on Evolutionary Computation in Combinatorial Optimization (Valencia, Spain)
- 04/2007      **Member** of the *Program Committee* of SIS 2007: IEEE Swarm Intelligence Symposium (Hawaii, US)
- 02/2007      **Member** of the *Program Committee* of MAEB 2007: IV Congreso Español de Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (Tenerife, Spain)

- 11/2006      **Member** of the *Program Committee* of CIS 2006: International Conference on Computational Intelligence and Security (Guangzhou, China)
- 09/2006      **Member** of the *Program Committee* of ANTS 2006: Fifth International Conference on Ant Colony Optimization and Swarm Intelligence (Brussels, Belgium)
- 09/2006      **Member** of the *Program Committee* of PPSN 2006: International Conference on Parallel Processing in Nature (Reykjavik, Iceland)
- 09/2006      **Member** of the *Program Committee* of WSC11: 11th Online World Conference on Soft Computing in Industrial Applications (World Wide Web)
- 07/2006      **Member** of the *Program Committee* of CEC 2006: IEEE Congress on Evolutionary Computation (Vancouver, Canada)
- 05/2006      **Member** of the *Program Committee* of WEA 2006: 5th International Workshop on Efficient and Experimental Algorithms (Menorca Island, Spain)
- 04/2006      **Member** of the *Program Committee* of EvoCOP 2006: 5th European Conference on Evolutionary Computation in Combinatorial Optimization (Budapest, Hungary)
- 10/2005      **Member** of the *Program Committee* of LSCS 2005: Second International Workshop on Local Search Techniques in Constraint Satisfaction (Sitges, Spain)
- 10/2005      **Member** of the *Program Committee* of EA 2005: International Conference on Artificial Evolution (Lille, France)
- 09/2005      **Member** of the *Program Committee* of WSC10: 10th Online World Conference on Soft Computing in Industrial Applications (World Wide Web)
- 09/2005      **Member** of the *Program Committee* of MAEB 2005: IV Congreso Español de Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (Granada, Spain)
- 08/2005      **Member** of the *Program Committee* of MIC 2005: 6th Metaheuristics International Conference (Vienna, Austria)
- 07/2005      **Member** of the *Program Committee* of AD 2005: Agent Days (Malaga, Spain)

03/2005	<b>Member</b> of the <i>Program Committee</i> of EvoCOP 2005: 5th European Conference on Evolutionary Computation in Combinatorial Optimization (Lausanne, Switzerland)
09/2004	<b>Member</b> of the <i>Program Committee</i> of PPSN 2004: International Conference on Parallel Processing in Nature (Birmingham, UK)
09/2004	<b>Member</b> of the <i>Program Committee</i> of ANTS 2004: Fourth International Workshop on Ant Algorithms (Brussels, Belgium)

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## REFeree ACTIVITIES

<b>Projects</b>	Project referee for the Spanish Ministry of Science and Innovation (MICINN) Project referee for the Austrian Science Fund Project referee for the Belgian Fonds de Recherche Scientifique (FNRS)
<b>Conferences non-PC member</b>	Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2001) Metaheuristics International Conference (MIC 2001) First International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS 2002) From Ant Colonies to Artificial Ants: 3rd International Workshop on Ant Algorithms (ANTS 2002) Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2002) Congress on Evolutionary Computation (CEC 2002) Genetic and Evolutionary Computation Conference (GECCO 2002) Parallel Processing from Nature (PPSN 2002) First Australian Conference on Artificial Life (ACAL 2003) American Control Conference (ACC 2003) 3rd European Workshop on Evolutionary Computation in Combinatorial Optimization (EvoCOP 2003) Evolutionary Computation in Combinatorial Optimization, 4th European Conference (EvoCOP 2004) International Conference on Computer Aided Design (ICCAD 2004)
<b>Journals</b>	Annals of Operations Research Artificial Life Computational Optimization and Applications Computer Science Reviews Computers & Operations Research

Constraints  
European Journal of Operational Research  
Evolutionary Computing  
IEEE Transactions on Evolutionary Computation  
IEEE Transactions on Systems, Man and Cybernetics – Part B  
Information Processing Letters  
Information Sciences  
INFORMS Journal on Computing  
International Journal of Approximate Reasoning  
International Journal of Control, Automation, and Systems  
International Journal of Production Research  
International Journal of Systems Science  
Journal of Artificial Intelligence Reviews  
Journal of Engineering Manufacture  
Journal of Experimental Algorithmics  
Journal of Heuristics  
Journal of Mathematical Modelling and Algorithms  
Journal of Scheduling  
Journal of Sound and Vibration  
Management Science  
Memetic Computing  
Networks  
Neurocomputing  
Novatica  
Optimization Letters  
Pattern Analysis and Applications  
Soft Computing  
Swarm Intelligence

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## TUTORIALS

- |         |                                                                                                                                      |
|---------|--------------------------------------------------------------------------------------------------------------------------------------|
| 07/2011 | Invited tutorial on <i>ant colony optimization</i> at GECCO 2011: Genetic and Evolutionary Computation Conference (Dublin, Ireland)  |
| 07/2009 | Invited tutorial on <i>ant colony optimization</i> at GECCO 2009: Genetic and Evolutionary Computation Conference (Montreal, Canada) |
| 09/2008 | Invited tutorial <i>Swarm Intelligence</i> at PPSN 2008: Parallel Problem Solving in Nature (Dortmund, Germany)                      |

- 09/2007 Invited tutorial *Ant colony optimization: Introduction and recent hybridizations* at HIS 2007: Hybrid Intelligent Systems (Kaiserslautern, Germany)
- 07/2007 Invited tutorial on *ant colony optimization* at GECCO 2007: Genetic and Evolutionary Computation Conference (London, UK)
- 07/2006 Invited tutorial on *ant colony optimization* at GECCO 2006: Genetic and Evolutionary Computation Conference (Seattle, USA)
- 11/2005 Tutorial *Ant colony optimization: Introduction and recent advances* at HIS 2005: Hybrid Intelligent Systems (Rio de Janeiro, Brasil)
- 06/2005 Invited tutorial on *ant colony optimization* at GECCO 2005: Genetic and Evolutionary Computation Conference (Washington, USA)

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#### INVITED TALKS AND PANEL DISCUSSIONS

- 12/2010 Talk on *Hybrid metaheuristics*, Nature Inspired Computation and Applications Laboratory (NICAL), University of Science and Technology of China, Hefei, China. Invited by **Xin Yao**
- 05/2010 Keynote talk on *Hybrid metaheuristics* at BIOMA 2010, Ljubljana, Slovenia. Invited by **Jurij Silc**
- 12/2009 Talk on *Solving the k-cardinality tree problem*, EPFL, Lausanne, Switzerland. Invited by **Pascal Fua**
- 06/2009 Talk on *Integrating Beam-ACO with constraint programming for single machine job scheduling*, University of Viena, Austria. Invited by **Richard Hartl**
- 06/2009 Talk on *Integrating Beam-ACO with constraint programming for single machine job scheduling*, Technical University of Viena, Austria. Invited by **Günther Raidl**
- 09/2008 Talk on *Ant colony optimization hybrids* at ANTS 2008, Brussels, Belgium. Invited by **Marco Dorigo**
- 07/2008 Talk on *Ant colony optimization*, Center for Genomic Regulation, Comparative Bioinformatics Group, Barcelona. Invited by **Cedric Notredame**
- 01/2008 Talk on *Beam-ACO: Hybridizing ant colony optimization with beam search*, University of Viena, Austria. Invited by **Karl Dörner and Richard Hartl**

- 12/2007      Talk on *Beam-ACO: A hybrid between ant colony optimization and beam search*, University of Porto, Portugal. Invited by **Joao Pedroso**
- 09/2007      Member of a panel discussion on *The future and challenges of stochastic local search engineering* at SLS 2007, Brussels, Belgium. Invited by **Holger Hoos and Thomas Stützle**
- 03/2006      Talk on *Introduction to ant colony optimization*, University of Trento, Italy. Invited by **Roberto Battiti**
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#### PARTICIPATION IN PHD DEFENSE JURIES

- 11/2010      **Guillermo Molina Arribere**, *Técnicas de optimización para redes de sensores*, Universidad de Málaga, Spain
- 06/2008      **Todd James Treangen**, *Novel Computational Methods for Large-Scale Genome Comparison*, Universitat Politècnica de Catalunya, Spain
- 05/2007      **Stephen Gilmore**, *Meshing Structural Knowledge And Heuristics: Improving Ant Colony Optimization Via Kernelization-Based Templates*, MacQuarie University, Australia
- 

#### TEACHING

- Fall 2011      Programming in C++ (PRO1), FIB, UPC, Barcelona (120 hours)
- Fall 2011      Responsible professor for "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona (12 hours)
- Spring 2011      Algoritmia (ALG), Facultat d'Informàtica, UPC, Barcelona (28 hours)
- Fall 2010      Programming in C++ (P1), FIB, UPC, Barcelona (120 hours)
- Fall 2010      Responsible professor for "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona (12 hours)
- Spring 2010      Programming in C++ (P1), Facultat d'Informàtica, UPC, Barcelona (28 hours)
- Spring 2010      Algoritmia (ALG), Facultat d'Informàtica, UPC, Barcelona (20 hours)

Fall 2009	Programming in C++ (P1), Facultat d'Informàtica, UPC, Barcelona (56 hours)
Fall 2009	Responsible professor for "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona (12 hours)
Spring 2009	Programming in C++ (P1), Facultat d'Informàtica, UPC, Barcelona (28 hours)
Spring 2009	Algoritmia (ALG), Facultat d'Informàtica, UPC, Barcelona (22 hours)
Fall 2009	Programming in C++ (P1), Facultat d'Informàtica, UPC, Barcelona (56 hours)
Fall 2009	16 hours module on <i>metaheuristics</i> within the "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona
Spring 2008	Algoritmia (ALG), Facultat d'Informàtica, UPC, Barcelona (22 hours)
Fall 2007	16 hours module on <i>metaheuristics</i> within the "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona
Spring 2007	Algoritmia (ALG), Facultat d'Informàtica, UPC, Barcelona (20 hours)
Fall 2006	Informàtica I, Facultat de Matemàtiques i Estadístiques , UPC, Barcelona (28 hours)
Fall 2006	12 hours module on <i>metaheuristics</i> within the "Seminar of Algorithms and Programming" (SAP), Master program on software, Department LSI, UPC, Barcelona
03/2006	20 hours course on <i>metaheuristics</i> , Universidad de Málaga, Málaga, Spain (2 credits)
05/2004	2 hours course for undergraduate students on <i>metaheuristics in combinatorial optimization</i> , Universitat Politècnica de Catalunya, Barcelona, Spain
02/2004	2 hours course for PhD students on <i>metaheuristics in combinatorial optimization</i> at the Universitat Politècnica de Catalunya, Barcelona, Spain
11/2003	3 hours course for undergraduate students on <i>metaheuristics in combinatorial optimization</i> , Université Libre de Bruxelles, Brussels, Belgium

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## GRADUATE STUDENTS

- Since 03/2011      **Sergi Mateo Bellido**, *Híbrido de optimización por colonia de hormigas para el problema de hallar la arborescencia enraizada con peso mínimo*
- 07/2008            **Pedro Jesús Copado Méndez**, *Hibridación de la Metaheurística ACO para el Shortest Capacitated Paths Problem*
- 07/2006            **Mateu Yábar Vallès**, *Ant Colony Optimization for DNA Sequencing by Hybridization*

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## MASTER STUDENTS

- 07/2010            **Pedro Jesús Copado Méndez**, *Development of a Hybrid Metaheuristic for the Efficient Solution of Strategic Supply Chain Management Problems: Application to the Energy Sector*
- 07/2008            **Hugo Hernández Pibernat**, *Ant Colony Optimization for Energy-Efficient Multi-Casting in Wireless Ad-Hoc Networks*

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## PHD STUDENTS

- Since 07/2008      **Hugo Hernández Pibernat**, *Swarm Intelligence Methods for the Management of Large-Scale Sensor Networks*

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## SUPERVISION OF OTHER PROJECTS

- 03/2004            **Co-supervisor** of a pilot project on hybridizing ant colony optimization and constraint programming. In cooperation with Bernd Meyer, Monash University, Australia

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## EVALUATIONS IN THE SPANISH RESEARCH SYSTEM

05/2011	<i>Agreditación de profesor titular (TU)</i> obtained from the Agencia Nacional de Evaluación de la Calidad y Acreditación (ANECA)
01/2011	Positive evaluation within the <i>I3 program</i> of the Spanish Ministry of Science and Innovation
12/2010	Validation of the equivalence of my PhD (in Spanish: <i>homologación</i> ) at the Universitat Politècnica de Catalunya
07/2009	<i>Acreditació de recerca</i> obtained from the Agència per a la Qualitat del Sistema Universitari de Catalunya (AQU)

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## VARIOUS

<b>Programming</b>	<b>Java</b> (Swing, RMI, Jini, CORBA, JDBC, XML DOM) <i>Experience: 3 years</i>
	<b>C++</b> (development of optimization software) <i>Experience: 10 years</i>
	<b>Smalltalk</b> (development of AI applications) <i>Experience: 3 years</i>
	Basic knowledge of <b>Pascal, Modula2, Fortran, Lisp, Prolog</b>
<b>Languages</b>	<b>German</b> (mother language)
	<b>English</b> (fluent, written and spoken)
	<b>Spanish</b> (fluent, written and spoken)
	<b>French</b> (basic knowledge)

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## PUBLICATIONS

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### THESES

- [1] C. Blum. Optimality criteria and local search methods for node-weighted  $k$ -cardinality tree and subgraph problems. Master's thesis, Department of Mathematics, University of Kaiserslautern, Germany, 1998. Thesis to obtain the title of a Diplom-Mathematiker (in german).
- [2] C. Blum. Metaheuristics for Group Shop Scheduling. Master's thesis, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, 2002. Thesis to obtain the Diplôme d'Etudes Approfondies en Sciences Appliquées (DEA).
- [3] C. Blum. *Theoretical and Practical Aspects of Ant Colony Optimization*. PhD thesis, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, February 2004.

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### BOOKS

- [4] C. Blum. *Theoretical and Practical Aspects of Ant Colony Optimization*, volume 282 of *Dissertationen zur Künstlichen Intelligenz*. Akademische Verlagsgesellschaft Aka GmbH, Berlin, Germany, 2004.

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### EDITED BOOKS

- [5] E. Alba, C. Blum, P. Isasi, C. León, and J. A. Gómez, editors. *Optimization Techniques for Solving Complex Problems*. Parallel and Distributed Computing. John Wiley & Sons, Hoboken, NJ, 2009.
- [6] C. Blum, M. J. Blesa Aguilera, A. Roli, and M. Sampels, editors. *Hybrid Metaheuristics—An Emerging Approach to Optimization*, volume 114 of *Studies in Computational Intelligence*. Springer Verlag, Berlin, Germany, 2008.
- [7] C. Blum and D. Merkle, editors. *Swarm Intelligence—Introduction and Applications*. Natural Computing. Springer Verlag, Berlin, Germany, 2008.

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### EDITED PROCEEDINGS

- [8] F. Almeida, M. J. Blesa Aguilera, C. Blum, J. M. Moreno Vega, M. Pérez Pérez, A. Roli, and M. Sampels, editors. *Proceedings of HM 2006 – Third International Workshop on Hybrid Metaheuristics*, volume 4030 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2006.
- [9] T. Bartz-Beielstein, M. J. Blesa Aguilera, C. Blum, B. Naujoks, A. Roli, G. Rudolph, and M. Sampels, editors. *Proceedings of HM 2007 – Fourth International Workshop on*

*Hybrid Metaheuristics*, volume 4771 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2007.

- [10] H.-G. Beyer, U.-M. O'Reilly, D.V. Arnold, W. Banzhaf, C. Blum, E.W. Bonabeau, E. Cantú Paz, D. Dasgupta, K. Deb, J.A. Foster, E.D. de Jong, H. Lipson, X. Llorca, S. Mancoridis, M. Pelikan, G.R. Raidl, T. Soule, A. Tyrrell, J.-P. Watson, and E. Zitzler, editors. *Proceedings of GECCO 2005 – Genetic and Evolutionary Computation Conference*. ACM Press, New York, NY, 2005.
- [11] M. J. Blesa, C. Blum, L. di Gaspero, A. Roli, M. Sampels, and A. Schaerf, editors. *Proceedings of HM 2009 – Sixth International Workshop on Hybrid Metaheuristics*, volume 5818 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2009.
- [12] M. J. Blesa, C. Blum, G. Raidl, A. Roli, and M. Sampels, editors. *Proceedings of HM 2010 – Seventh International Workshop on Hybrid Metaheuristics*, volume 6373 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2010.
- [13] M. J. Blesa, C. Blum, A. Roli, and M. Sampels, editors. *Proceedings of HM 2005 – Second International Workshop on Hybrid Metaheuristics*, volume 3636 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2005.
- [14] M. J. Blesa Aguilera, C. Blum, C. Cotta, A. J. Fernández, J. E. Gallardo, A. Roli, and M. Sampels, editors. *Proceedings of HM 2008 – Fifth International Workshop on Hybrid Metaheuristics*, volume 5296 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2008.
- [15] C. Blum and R. Battiti, editors. *Proceedings of LION 4 – Fourth International Conference on Learning and Intelligent Optimization*, volume 6073 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2010.
- [16] C. Blum, A. Roli, and M. Sampels, editors. *Proceedings of HM 2004 – First International Workshop on Hybrid Metaheuristics*. 2004. ISBN 3-00-015331-4.
- [17] M. Cattolico, M. Keijzer, D.V. Arnold, V. Babovic, C. Blum, P. Bosman, M. Butz, C. A. Coello Coello, D. Dasgupta, K. Deb, S. G. Ficici, J.A. Foster, A. Hernández-Aguirre, G. Hornby, H. Lipson, P. McMinn, J. Moore, G. R. Raidl, F. Rothlauf, C. Ryan, and D. Thierens, editors. *Proceedings of GECCO 2006 – Genetic and Evolutionary Computation Conference*. ACM Press, New York, NY, 2006.
- [18] M. Dorigo, M. Birattari, C. Blum, M. Clerc, T. Stützle, and A. Winfield, editors. *Proceedings of ANTS 2008 – Sixth International Workshop on Ant Colony Optimization and Swarm Intelligence*, volume 5217 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2008.
- [19] M. Dorigo, M. Birattari, C. Blum, L. M. Gambardella, F. Mondada, and T. Stützle, editors. *Proceedings of ANTS 2004 – Fourth International Workshop on Ant Colony Optimization and Swarm Intelligence*, volume 3172 of *Lecture Notes in Computer Science*. Springer Verlag, Berlin, Germany, 2004.
- [20] F. Rothlauf, G. Raidl, G. Squillero, R. Drechsler, T. Stützle, M. Birattari, C. Bates Congdon, M. Middendorf, C. Blum, C. Cotta, P. Bosman, J. Grahl, J. Knowles, D. Corne,

H.-G. Beyer, K. Stanley, J. F. Miller, J. van Hemert, T. Lenaerts, M. Ebner, J. Bacardit, M. O'Neill, M. di Penta, B. Doerr, T. Jansen, R. Poli, and E. Alba, editors. *Proceedings of GECCO 2009 – Genetic and Evolutionary Computation Conference*. ACM Press, New York, NY, 2009.

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## BOOK CHAPTERS

- [21] M. Blesa and C. Blum. *Handbook of Approximation Algorithms and Metaheuristics*, chapter On Solving the Maximum Disjoint Paths Problem with Ant Colony Optimization. Computer and Information Science. Chapman & Hall/CRC, Boca Raton, Florida, 2007.
- [22] C. Blum and M. J. Blesa. *Optimization Techniques for Solving Complex Problems*, chapter Solving the KCT Problem: Large-Scale Neighborhood Search and Solution Merging, pages 407–421. Parallel and Distributed Computing. John Wiley & Sons, Hoboken, NJ, 2009.
- [23] C. Blum, C. Cotta, A. J. Fernández, J. E. Gallardo, and M. Mastrolilli. *Hybrid Metaheuristics—An Emerging Approach to Optimization*, volume 114 of *Studies in Computational Intelligence*, chapter Hybridizations of metaheuristics with branch & bound derivatives, pages 85–116. Springer Verlag, Berlin, Germany, 2008.
- [24] C. Blum and X. Li. *Swarm Intelligence—Introduction and Applications*, chapter Swarm Intelligence in Optimization, pages 43–86. Natural Computing. Springer Verlag, Berlin, Germany, 2008.
- [25] C. Blum, J. Puchinger, G. Raidl, and A. Roli. *Constraint Programming, Artificial Intelligence, and Operations Research*, chapter Hybrid Metaheuristics. Springer Verlag, Berlin, Germany, 2010. In press.
- [26] C. Blum and A. Roli. *Hybrid Metaheuristics—An Emerging Approach to Optimization*, volume 114 of *Studies in Computational Intelligence*, chapter Hybrid Metaheuristics: An Introduction, pages 1–30. Springer Verlag, Berlin, Germany, 2008.
- [27] C. Blum, A. Roli, and E. Alba. *Parallel metaheuristics: A new class of algorithms*, chapter An introduction to metaheuristic techniques, pages 3–42. John Wiley & Sons, Hoboken, NJ, 2005.
- [28] G. Leguizamón, C. Blum, and E. Alba. *Handbook of Approximation Algorithms and Metaheuristics*, chapter Evolutionary Computation. Computers and Information Science. Chapman & Hall/CRC, Boca Raton, Florida, 2007.
- [29] M. López-Ibáñez and C. Blum. *The Industrial Electronics Handbook*, chapter Ant Colony Optimization. CRC Press, second edition, 2011.
- [30] G. Raidl, J. Puchinger, and C. Blum. *Handbook of Metaheuristics*, chapter Metaheuristic Hybrids. Springer Verlag, Berlin, Germany, 2010. In press.
- [31] K. Socha and C. Blum. *Metaheuristic Procedures for Training Neural Networks*, volume 36 of *Operations Research/Computer Science Interfaces*, chapter Ant Colony Optimization, pages 153–180. Springer Verlag, Berlin, Germany, 2006.

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## BOOK REVIEWS

- [32] C. Blum. Review of the book "Ant Colony Optimization" by M. Dorigo and T. Stützle. *Artificial Intelligence*, 165:261–264, 2005.
- [33] C. Blum. Review of the book "organic computing" edited by R. P. Würtz. *Computer Science Review*, 3(4):263–267, 2009.

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## INTERVIEWS

- [34] C. Blum and D. Merkle. Interview with Guy Theraulaz. *Künstliche Intelligenz*, 4:40–41, 2005.
- [35] C. Blum and D. Merkle. Interview with Martin Middendorf. *Künstliche Intelligenz*, 4:42–43, 2005.

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## JOURNALS

- [36] M. J. Blesa and C. Blum. Finding edge-disjoint paths in networks by means of artificial ant colonies. *Journal of Mathematical Modelling and Algorithms*, 6(3):361–391, 2007. **Citations on Google Scholar: 3.**
- [37] C. Blum. Beam-ACO—Hybridizing ant colony optimization with beam search: An application to open shop scheduling. *Computers & Operations Research*, 32(6):1565–1591, 2005. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 143.**
- [38] C. Blum. Revisiting dynamic programming for finding optimal subtrees in trees. *European Journal of Operational Research*, 177(1):102–115, 2007. **Impact factor: 2.093, Rank 10 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 16.**
- [39] C. Blum. Beam-ACO for simple assembly line balancing. *INFORMS Journal on Computing*, 20(4):618–627, 2008. **Impact factor: 1.318, Rank 23 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 14.**
- [40] C. Blum, M. J. Blesa, and M. López Ibáñez. Beam search for the longest common subsequence problem. *Computers & Operations Research*, 36(12):3178–3186, 2009. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 9.**
- [41] C. Blum and M.J. Blesa. New metaheuristic approaches for the edge-weighted  $k$ -cardinality tree problem. *Computers & Operations Research*, 32(6):1355–1377, 2005.

**Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 50.**

- [42] C. Blum and M. Dorigo. The hyper-cube framework for ant colony optimization. *IEEE Transactions on Systems, Man, and Cybernetics – Part B*, 34(2):1161–1172, 2004. **Impact factor: 3.007, Rank 11 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, Citations on Google Scholar: 195.**
- [43] C. Blum and M. Dorigo. Search bias in ant colony optimization: On the role of competition-balanced systems. *IEEE Transactions on Evolutionary Computation*, 9(2):159–174, 2005. **Impact factor: 4.589, Rank 2 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, Citations on Google Scholar: 62. Winner of the IEEE Transactions on Evolutionary Computation Outstanding Paper Award (prize money: 1000 US dollars).**
- [44] C. Blum and M. Ehrgott. Local search algorithms for the  $k$ -cardinality tree problem. *Discrete Applied Mathematics*, 128:511–540, 2003. **Impact factor: 0.816, Rank 105 out of 204 journals in category MATHEMATICS, APPLIED, Citations on Google Scholar: 35. Selected for the Editors’ choice volume of 2003.**
- [45] C. Blum and C. Miralles. On solving the assembly line worker assignment and balancing problem via beam search. *Computers & Operations Research*, 38(1):328–339, 2011. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 1.**
- [46] C. Blum, J. Puchinger, G. Raidl, and A. Roli. Hybrid metaheuristics in combinatorial optimization: A survey. *Applied Soft Computing*, 11(6):4135–4151, 2011. **Impact factor: 2.415, Rank 22 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE.**
- [47] C. Blum and A. Roli. Metaheuristics in combinatorial optimization: Overview and conceptual comparison. *ACM Computing Surveys*, 35(3):268–308, 2003. **Impact factor: 7.667, Rank 1 out of 92 journals in category COMPUTER SCIENCE, THEORY & METHODS, Citations on Google Scholar: 851. Most cited survey paper on metaheuristics published in a journal.**
- [48] C. Blum and M. Sampels. An ant colony optimization algorithm for shop scheduling problems. *Journal of Mathematical Modelling and Algorithms*, 3(3):285–308, 2004. **Citations on Google Scholar: 93.**
- [49] C. Blum, M. Yabar, and M. J. Blesa. An ant colony optimization algorithm for DNA sequencing by hybridization. *Computers & Operations Research*, 35:3620–3635, 2008. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 20.**
- [50] V. Hemmelmayr, V. Schmid, and C. Blum. Variable neighbourhood search for the variable sized bin packing problem. *Computers & Operations Research*, 39(5):1097–1108,

2012. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE.**

- [51] H. Hernández and C. Blum. Ant colony optimization for multicasting in wireless ad hoc networks. *Swarm Intelligence*, 3(2):125–148, 2009. **Citations on Google Scholar: 8.**
- [52] H. Hernández and C. Blum. Foundations of ANTCYCLE: Self-synchronized duty-cycling in mobile sensor networks. *The Computer Journal*, 54(9):1427–1448, 2011. **Impact factor: 1.394, Rank 17 out of 49 journals in category COMPUTER SCIENCE, HARDWARE & ARCHITECTURE.**
- [53] H. Hernández and C. Blum. Minimum energy broadcasting in wireless sensor networks: An ant colony optimization approach for a realistic antenna model. *Applied Soft Computing*, 2011. In press. **Impact factor: 2.415, Rank 22 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE.**
- [54] M. López Ibáñez and C. Blum. Beam-ACO for the travelling salesman problem with time windows. *Computers & Operations Research*, 37(9):1570–1583, 2010. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE, Citations on Google Scholar: 10.**
- [55] M. Mastrolilli and C. Blum. On the use of different types of knowledge in metaheuristics based on constructing solutions. *Engineering Applications of Artificial Intelligence*, 23(5):650–659, 2010. **Impact factor: 1.444, Rank 46 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, Citations on Google Scholar: 6.**
- [56] D. Merkle and C. Blum. Swarm intelligence – An optimization-based introduction. *Künstliche Intelligenz*, 4:5–10, 2005.
- [57] J. Rahmel, C. Blum, and P. Hahn. Diagnosis of finger dysfunction caused by ulnar nerve lesions. *Journal of Intelligent Systems*, 8(1/2), 1998.
- [58] A. Roli, S. Benedettini, T. Stützle, and C. Blum. Large neighbourhood search algorithms for the founder sequence reconstruction problem. *Computers & Operations Research*, 39(2):213–224, 2012. **Impact factor: 2.116, Rank 9 out of 73 journals in category OPERATIONS RESEARCH & MANAGEMENT SCIENCE.**
- [59] K. Socha and C. Blum. An ant colony optimization algorithm for continuous optimization: Application to feed-forward neural network training. *Neural Computing & Applications*, 16(3):235–248, 2007. **Impact factor: 0.812, Rank 80 out of 103 journals in category COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, Citations on Google Scholar: 29.**
- [60] E. Turetken, G. González, C. Blum, and P. Fua. Automated reconstruction of dendritic and axonal trees by global optimization with geometric priors. *Neuroinformatics*, 9(2-3):279–302, 2011. **Impact factor: 3.054, Rank 8 out of 95 journals in category COMPUTER SCIENCE, INTERDISCIPLINARY APPLICATIONS.**

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#### INVITED JOURNALS

- [61] C. Blum. Ant colony optimization: Introduction and recent trends. *Physics of Life Reviews*, 2(4):353–373, 2005. **Impact factor: 3.774, Rank 17 out of 74 journals in category BIOPHYSICS, Citations on Google Scholar: 157.**
- [62] C. Blum. Iterated local search and constructive heuristics for error correcting code design. *International Journal of Innovative Computing and Applications*, 1(1):14–22, 2007. **Citations on Google Scholar: 6.**
- [63] M. Dorigo and C. Blum. Ant colony optimization theory: A survey. *Theoretical Computer Science*, 344(2-3):243–278, 2005. **Impact factor: 0.943, Rank 52 out of 92 journals in category COMPUTER SCIENCE, THEORY & METHODS, Citations on Google Scholar: 441. Winner of the Theoretical Computer Science Top Cited Article 2005–2010 Award.**

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#### JOURNAL SPECIAL ISSUES

- [64] C. Blum, editor. *Special Issue on “Hybrid Metaheuristics”*. Computers & Operations Research, 37 (3), 430–609, 2010.
- [65] C. Blum and R. Battiti, editors. *Special Issue on “Learning and Intelligent Optimization”*. Annals of Mathematics and Artificial Intelligence, 2011. In press.
- [66] C. Blum, A. Roli, and M. Sampels, editors. *Special Issue on “Hybrid Metaheuristics”*. Journal of Mathematical Modelling and Algorithms, 5 (1), 1–137, 2006.
- [67] D. Merkle and C. Blum, editors. *Special Issue on “Swarm Intelligence”*. Journal Künstliche Intelligenz, 4, 1–41, 2005.

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#### CONFERENCES AND WORKSHOPS

- [68] L. Baumgartner, V. Schmid, and C. Blum. Solving the two-dimensional bin packing problem with a probabilistic multi-start heuristic. In C. Coello Coello, editor, *Proceedings of LION 5 – 5th International Conference on Learning and Intelligent Optimization*, Lecture Notes in Computer Science. Springer Verlag, Berlin, Germany, 2011. In press.
- [69] J. Bautista, C. Blum, and J. Pereira. Equilibrado de líneas de montaje mediante Beam ACO. In J. M. Moreno Vega et al., editor, *Actas del V Congreso Español sobre Metaheurísticas, Algoritmos Evolutivos y Bioinspirados (MAEB 2007)*. Thomson Publishers, 2007.
- [70] S. Benedettini, C. Blum, and A. Roli. A randomized iterated greedy algorithm for the founder sequence reconstruction problem. In C. Blum and R. Battiti, editors, *Proceedings of LION 4 – Fourth International Conference on Learning and Intelligent Optimization*, volume 6073 of *Lecture Notes in Computer Science*, pages 37–51. Springer Verlag, Berlin, Germany, 2010.

- [71] M. Blesa and C. Blum. A nature-inspired algorithm for the disjoint paths problem. In *9th International Workshop on Nature Inspired Distributed Computing (NIDISC'06)*, page 8 pp. (published 1 page as no. 239). IEEE Computer Society Press, 2006.
- [72] M. J. Blesa and C. Blum. Ant colony optimization for the maximum edge-disjoint paths problem. In G. R. Raidl et al., editor, *Applications of Evolutionary Computing, Proceedings of EvoWorkshops 2004*, volume 3005 of *Lecture Notes in Computer Science*, pages 160–169. Springer Verlag, Berlin, Germany, 2004.
- [73] C. Blum. ACO applied to group shop scheduling: A case study on intensification and diversification. In M. Dorigo, G. Di Caro, and M. Sampels, editors, *Proceedings of ANTS 2002 – From Ant Colonies to Artificial Ants: Third International Workshop on Ant Algorithms*, volume 2463 of *Lecture Notes in Computer Science*, pages 14–27. Springer Verlag, Berlin, Germany, 2002.
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