

# Rong Qu, PhD, BSc in Computer Science

## Career History

**Lecturer** May 2005 – present

School of Computer Science, The University of Nottingham, UK, NG8 1BB

**Post-Doctoral Research Associate** Aug 2001 – May 2005

School of Computer Science, The University of Nottingham, UK, NG8 1BB

**Assistant Engineer** Jul 1996 – Jan 1998

Xi'an Heavy Machinery Institute of BaoGang Steel Corp., China

## Qualifications

- PhD in Computer Science, University of Nottingham, Nottingham, U.K. Sep 1998 – Sep 2002
- BSc in Computer Science and Its Applications, XiDian University, Xi'an, China. Aug 1992 – Jul 1996

## Academic Duties

- **Chair** (with Tan Kay Chen and Michel Gendreau) of the 2009 IEEE Symposium on Computational Intelligence in Scheduling (CI-Sched 2009), Nashville, TN, USA, Mar 30 - Apr 2, 2009
- **Guest Editor** (with Tan Kay Chen and Michel Gendreau) for the forthcoming Special Issue of Memetic Computing for Computational Intelligence in Scheduling, 2010
- **Guest Editor** (with Maria Fox and Derek Long) for the forthcoming Special Issue of Journal of Scheduling on Artificial Intelligence Planning and Scheduling, 2009
- **Chair** (with Professor Tsang) of the special session on Computational Intelligence Methods in Finance and Management at The 6th International Conference on Computational Management Science (CMS2009), Geneva, May 1-3 2009
- **Chair** of Working Group on Evolutionary Scheduling and Timetabling at Technical Committee of IEEE Computational Intelligence Society, (June 2006 - present)
- **Program chair** of The 25th Workshop of the UK Planning and Scheduling Special Interest Group (PlanSIG'06), Nottingham, 14<sup>th</sup>-15<sup>th</sup>, Dec, 2006
- **Publicity chair** of 2007 IEEE Symposium on Computational Intelligence in Scheduling (CISched'07), Honolulu, Hawaii, 1<sup>st</sup>-5<sup>th</sup> Apr, 2007
- **Committee member** of the Special Interest Group on Local Search at The OR Society
- **Organizing team member** of The 2007 second International Timetabling Competition, sponsored by International Series of Conferences on the Practice and Theory of Automated Timetabling and The Working Group on Automated Timetabling in Association of European Operational Research Societies (EURO)
- **Program committee member**
  - 2009 International Conference on Knowledge Engineering and Ontology Development (KEOD 2009), Madeira, 5 - 8 October, 2009, Portugal
  - Scheduling and Planning Applications woRKshop SPARK at the 19th International Conference on Automated Planning and Scheduling (ICAPS'09), September 19-23, 2009, Thessaloniki, Greece
  - IEEE-RIVF International Conference on Computing and Telecommunication Technologies 2009 (IEEE-RIVF 2009), Da Nang City, Vietnam, July 13-17, 2009
  - IEEE Congress on Evolutionary Computation 2009 (IEEE CEC 2009), Trondheim, Norway, May 18-21, 2009
  - The 7th International Series of Conferences on the Practice and Theory of

- Automated Timetabling (PATAT'08), Université de Montréal, August 19 - 22, 2008
- The 27th Workshop of the UK Planning and Scheduling Special Interest Group (PlanSIG'08), Edinburgh, UK, 11th - 12th December, 2008
- The 26th Workshop of the UK Planning and Scheduling Special Interest Group (PlanSIG'07), Prague, Czech Republic, 17th - 18th December, 2007
- The 2007 IEEE Symposium on Computational Intelligence in Scheduling (CISched'07), Honolulu, Hawaii, 1<sup>st</sup>-5<sup>th</sup> Apr, 2007
- The 20th International Conference on Industrial, Engineering & Other Applications of Applied Intelligent Systems (IEA/AIE 2007), Kyoto, Japan, June 26-29, 2007
- Paper review for Bio-Inspired Computing: Theories and Applications (BIC-TA 2007), Zhengzhou, China. September 14-17, 2007
- The 6th International Series of Conferences on the Practice and Theory of Automated Timetabling (PATAT'06), Brno, Czech Republic, 30<sup>th</sup> Aug – 1<sup>st</sup> Sep 2006
- International journal paper reviews: *Annals of OR*, *Applied Intelligence*, *Asia-Pacific Journal of Operations Research*, *Automation on Construction*, *European Journal of Operational Research*, *Expert Systems*, *IEEE Computational Intelligence Magazine*, *IEEE Transactions on Evolutionary Computation*, *Information Systems and Operational Research (INFOR)*, *INFORMS Journal of Computing*, *International Journal of Computer Mathematics*, *International Journal of Management and Decision Making*, *International Transactions on Operational Research*, *Journal of Computers & Applications*, *Journal of Heuristics*, *Journal of Operations Research Society*, *Journal of Scheduling*, *Knowledge Management Research & Practice*, *Memetic Computing*, *The IMA Journal of Management Mathematics*, *Operations Research*
- WATT working group administrator (Oct 2005 - present)
- Book reviews for The OR Society
- Course Director of e-commerce and digital business (2006/07 - present) and Computer Science and Management Studies (2008/09) in School of Computer Science, responsible for
  - Monitoring the course structures and specifications with regard to the learning outcomes and regulations
  - Coordinating the two courses with other courses in the School of Computer Science and Business School with regard to the changes in modules concerning pre-requisites, content and assessment with regard to module specifications
  - Approval of students' module registrations and course transfers
- School Marketing officer (2007 - present)
- Module convenor
  - Artificial Intelligence Programming (2<sup>nd</sup> year UG module, 2006/2007 - present)
  - Introduction on Artificial Intelligence (2<sup>nd</sup> year UG module, 2006/2007 – present)
  - Artificial Intelligence Methods (1<sup>st</sup> year UG module, 2005/2006 – 2007/2008)
  - Formal Specifications (3<sup>rd</sup> year UG module, 2006/2007 - 2007/2008)
  - Foundations of Artificial Intelligence (PGT module, 2007/2008)
  - Decision Support Methodologies (PGT module, 2008/2009)
- Invited to design and deliver a new one-week UG course at University of Applied Sciences Konstanz, Germany on “Artificial Intelligence Search Algorithms”, 18<sup>th</sup> – 22<sup>nd</sup> May, 2009, to be supported by Erasmus teaching mobility scheme
- Nominated at 2009 Lord Dearing Awards of Excellence in Learning and Teaching

**Teaching and Administrative Experiences**

**Research and Publications**

**Peer-reviewed journal papers**

\*corresponding/main author

- **R. Qu\***, E.K. Burke, B. McCollum. Adaptive Automated Construction of Hybrid Heuristics for Exam Timetabling Problems. To appear in *European Journal of*

*Operational Research*, doi:10.1016/j.ejor.2008.10.001, 2009

- **R. Qu\***, E.K. Burke. Hybridisations within a Graph Based Hyper-heuristic Framework for University Timetabling Problems. To appear at *Journal of Operational Research Society*, doi: 10.1057/jors.2008.102, 2009
- P. Brucker, E.K. Burke, T. Curtois, **R. Qu\***, G. Vanden Berghe. A Shift Sequence Based Approach for Nurse Scheduling and a New Benchmark Dataset. To appear in *Journal of Heuristics*, doi: 10.1007/s10732-008-9099-6, 2009
- B. McCollum, P. McMullan, B. Paechter, R. Lewis, A. Schaerf, L. Di Gaspero, A. J. Parkes, **R. Qu**, E.K. Burke. Setting the Research Agenda in Automated Timetabling: The Second International Timetabling Competition. To appear in *INFORMS Journal of Computing*, 2009
- E.K. Burke, J. Li, **R. Qu**. A Hybrid Model of Integer Programming and Variable Neighbourhood Search for Highly-Constrained Nurse Rostering Problems. accepted in special Issue of *European Journal of Operational Research*
- E.K. Burke, A.J. Eckersley, B. McCollum, S. Petrovic, **R. Qu\***. Hybrid Variable Neighborhood Approaches to University Exam Timetabling. Accepted by *European Journal of Operational Research*, 2009
- **R. Qu\***, E.K. Burke, B. McCollum, L.T.G. Merlot, S.Y. Lee. A Survey of Search Methodologies and Automated System Development for Examination Timetabling. *Journal of Scheduling*, doi: 10.1007/s10951-008-0077-5, **12**(1): 55-89, 2009  
Google scholar citations: 24
- E.K. Burke, T.E. Curtois, G. Post, **R. Qu**, B. Veltman, A Hybrid Heuristic Ordering and Variable Neighbourhood Search for the Nurse Rostering Problem, *European Journal of Operational Research*, **2**: 330-341, 2008
- E.K. Burke, S. Petrovic, **R. Qu\***. A Graph-Based Hyper-Heuristic for Educational Timetabling Problems, *European Journal of Operational Research*, **176**: 177-192, 2007  
ISI citations: 23, **the top 1% cited in Computer Science**, Google scholar citations: 71
- E.K. Burke, S. Petrovic, **R. Qu\***. Case-Based Heuristic Selection for Timetabling Problems, *Journal of Scheduling*, **9**: 115-132, 2006  
ISI citations: 20, **the top 2% cited in Computer Science**, Google scholar citations: 65
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu\***. Multi-Retrieval Case-based Reasoning for Course Timetabling Problems, *Journal of Operational Research Society*, **57**(2): 148-162, 2006
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu\***. Structured Cases in Case-Based Reasoning-Re-using and Adapting Cases for Timetabling Problems, *Knowledge-Based Systems*, **13**(2-3): 159-165, 2000

#### Under review

- E.K. Burke, J. Li, S. Petrovic, **R. Qu**. Embedding Goal Programming within a Falling Tide Algorithm: a New Attempt to Solve Nurse Rostering with both Hard and Soft Constraints. 2008
- E.K. Burke, T. Curtois, **R. Qu**, G. Vanden Berghe. A Scatter Search for the Nurse Rostering Problem, 2008
- E.K. Burke, T. Curtois, **R. Qu**, G. Vanden Berghe. A Time Pre-defined Variable Depth Search for Nurse Rostering, 2008
- E. K. Burke, J. Li, **R. Qu**. Pareto-Based Optimization for Multi-objective Nurse Scheduling, 2008
- **R. Qu\***, Y. Xu, J. Castro, D. Landa-Silva. Particle Swarm Optimization for the Steiner Tree in Graph and Delay-Constrained Multicast Routing Problems, 2009.
- Burke E.K., Li J., **Qu R**. The Application of Neural Network and Logistic Regression in the Hyper-heuristic Search, 2009
- B. McCollum, P. McMullan, E.K. Burke, A.J. Parkes, **R. Qu**, A New Model for Automated Examination Timetabling, 2009

- E.K. Burke, N. Pham, **R. Qu**, J. Yellen. Linear Combinations of Heuristics for Examination Timetabling, 2009
- N.R. Sabar, M. Ayob, **R. Qu**, G. Kendall, A Graph Coloring Constructive Hyper-Heuristic for Examination Timetabling, 2009

#### Book/Book chapters/Journal Editorials

- **R. Qu** (ed.) Proceedings of the 25th Workshop of the UK Planning and Scheduling Special Interest Group (PlanSIG2006), December, 2006, Nottingham, UK. ISSN 1368-5708
- E.K. Burke, M. Dror, S. Petrovic, **R. Qu**. Hybrid Graph Heuristics in Hyper-Heuristics Applied to Exam Timetabling Problems. B.L. Golden, S. Raghavan and E.A. Wasil (eds.). *The Next Wave in Computing, Optimization, and Decision Technologies*. 79-91. Springer, 2005
- **R. Qu**, M. Fox, D. Long (Guest editors). Special Issue of Artificial Intelligence Planning and Scheduling at Journal of Scheduling, to appear 2009

#### Peer reviewed conference papers

- G. Ochoa, **R. Qu**, E.K. Burke, Analyzing the Landscape of a Graph Based Hyper-heuristic for Timetabling Problems, accepted by GECCO'09, 2009
- N.R. Sabar, M. Ayob, G. Kendall, **R. Qu**, Roulette wheel Graph Colouring for Solving Examination Timetabling Problems, accepted by COCOA'09, 2009
- **R. Qu\***, Y. Xu, G. Kendall, A Variable Descent Search Algorithm for Delay-Constrained Least-Cost Multicast Routing. Learning and Intelligent Optimization (LION 3), Trento, Italy, Jan 14-18, 2009
- **R. Qu\***, F. He, A Hybrid Constraint Programming Approach for Nurse Rostering Problems, AI-2008, 211-224, Cambridge, England, 9-11 December 2008
- J.R. Carrington, N. Pham, **R. Qu**, J. Yellen. An Enhanced Weighted Graph Model for Examination / Course Timetabling. PlanSIG 2007, 9-16, Prague, 2007.
- **R. Qu\***, E.K. Burke. Adaptive Decomposition and Construction for Examination Timetabling Problems. MISTA 2007, 418-425, Aug, 2007, Paris.
- S. Abdullah, U. Aickelin, E.K. Burke, A. Mohamed Din, **R. Qu**. Investigating a Hybrid Metaheuristic for Job Shop Rescheduling, Lecture Notes in Artificial Intelligence 4828, 357-368, 2007.
- M. Ayob, A.M.A. Malik, S. Abdullah, A.R. Hamdan, G. Kendall, **R. Qu**. Solving a Practical Examination Timetabling Problem: A Case Study. In: O. Gervasi and M. Gavrilova (Eds.): Lecture Notes in Computer Science 4707, Part III, 611–624, 2007.
- **R. Qu\***, E.K. Burke Hybrid Variable Neighbourhood Hyper-heuristics for Exam Timetabling Problems. *MIC'05*, 2005.
- P. Brucker, **R. Qu\***, E.K. Burke and G. Post. A Decomposition, Construction and Post-processing Approach for a Specific Nurse Rostering Problem. *MISTA'05*, 397-406. 2005.
- E. K. Burke, A. J. Eckersley, B. McCollum, S. Petrovic, **R. Qu**. Analysing Similarity in Exam Timetabling. In: *PATAT04*, 2004.
- E. Burke, A. Eckersley, B. McCollum, S. Petrovic, **R. Qu**, Similarity Measures for Exam Timetabling Problems. *MISTA2003*, 2003.
- E. Burke, A. Eckersley, B. McCollum, S. Petrovic, **R. Qu**, Using Simulated Annealing to Study Behaviour of Various Exam Timetabling Data Sets. *MIC2003*, 2003.
- E.K. Burke, S. Petrovic, **R. Qu\***. Case Based Heuristic Selection for Examination Timetabling. *SEAL'02*, 2002.
- S. Petrovic, **R. Qu\***. Case-Based Reasoning as a Heuristic Selector in a Hyper-Heuristic for Course Timetabling Problems. *Knowledge-Based Intelligent Information Engineering Systems and Allied Technologies*, Volume 82, 336-340. IOS Press. *KES'02*, 2002.

- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu\***. Knowledge Discovery in Hyper-Heuristic Using Case-Based Reasoning on Course Timetabling, *PATAT'02*, Aug 2002.
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu\***. Case-based Reasoning in Course Timetabling: An Attribute Graph Approach, *ICCBRO1*, LNAI 2080, 2001.
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu\***. Structured Cases in Case-Based Reasoning-Re-using and Adapting Cases for Timetabling Problems, awarded one of the six best technical papers at *ES'99*, 1999.

#### **PhD & BSc thesis**

- Case-Based Reasoning on for Course Timetabling Problems. Oct, 2002. University of Nottingham, UK.
- Development and Communication Control for BBS-98 Distributed System. Jul, 1996. XiDian University, P. R. China

#### **Other Research Esteems**

- Invited talk on "Recent Research on Nurse Rostering and Other Ongoing Research in Scheduling and Optimisation", Xi'an Jiao Tong University and XiDian University, China, March, 2008
- Invited summer school course (with Dr G. Ochoa) on "Recent Hyper-heuristics in Scheduling and Optimizations", Istanbul Technology University, Turkey, August 2007
- Next Generation Decision Support: Automating the Heuristic Design Process (EP/D061571/1)
  - Funding Body: EPSRC
  - Duration: 1st October 2006 - 30th September 2011
  - Amount Awarded: £2,663,528
  - PI: E.K.Burke; Co-I: R. Qu, S.Petrovic, G.Kendall, J.Garibaldi, N.Krasnogor, J.D. Landa Silva
- Developing Next Generation Rostering Software Using Advanced Scheduling Techniques
  - Funding body: KTP Scheme (KTP007074)
  - Duration: September 2008 - August 2010
  - PI: D. Landa-Silva; Co-I: E.K. Burke, R. Qu
- Prioritising Ways to Reduce the Impact of Maintenance on Journey Times
  - Funding Body: Scott Wilson (Highway Agency)
  - Duration: Jan-Dec 2008
  - Amount Awarded: £38,222
  - PI: T. Parry; Co-I: S. Cobb, R. Qu, B. Ryan
- Handling Uncertainties in Transportation and Logistics Using Granular Computing and Hyper-heuristics
  - Funding Body: Ningbo Municipal Science and Technology Bureau, China
  - Duration: September 2008 - December 2011
  - Amount Awarded: around £10,000
  - PI: R. Bai; Co-I: R. Qu, E. Burke, A. Bargiela

#### **Grants**