# Nataša Pržulj: Curriculum Vitæ

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Citizenship: Canadian

## Research Interests

Bioinformatics: cellular networks – modeling, heuristic algorithms; systems biology.
Proteomics: structure and function of protein-protein interaction networks.
Graph theory: structured families of graphs.

## Education

**Ph.D. Computer Science, University of Toronto, April 2005.**
Title: *Analyzing Large Biological Networks: Protein-Protein Interactions Example.*
Advisory Committee: Derek G. Corneil (CS, co-supervisor), Igor Jurisica (CS, co-supervisor), Rudi Mathon (CS), Gil Prive (Medical Biophysics).

**M.Sc. Computer Science, University of Toronto, January 2000.**
Title: *Minimal Hereditary Dominating Pair Graphs.*
Supervisor: Derek G. Corneil (CS).

**B.Sc. Computer Science, Simon Fraser University, April 1997.**
First Class Honors.
CGPA 3.85 out of 4.

**Department of Mathematics, University of Belgrade, September 1991-93.**
Completed 2 out of 4 years in Computer Science and Mathematics Program.
CGPA 9 out of 10.

## Contributions to Research and Development

### Refereed Journal Publications:

J10 **N. Pržulj** and D. J. Higham, "Modelling Protein-Protein Interaction Networks via a Stickiness Index," *Journal of the Royal Society Interface*, volume 3, number 10, pages 711 - 716, 2006.

J9 **N. Pržulj**, "Biological Network Comparison Using Graphlet Degree Distribution," Proceedings of the 2006 European Conference on Computational Biology (ECCB 2006), Eilat, Israel, January 21-24, 2007, acceptance rate 18%. *Bioinformatics*, in press, 2006.

J8 **N. Pržulj**, D. G. Corneil, and I. Jurisica, "Efficient estimation of graphlet frequency distributions in protein-protein interaction networks," *Bioinformatics*, volume 22, number 8, pages 974-980, 2006.

J7 M. Barrios-Rodiles, K. R. Brown, B. Ozdamar, Z. Liu, R. S. Donovan, F. Shinjo, Y. Liu, R. Bose, J. Dembowy, I. W. Taylor, V. Luga, **N. Pržulj**, M. Robinson, H. Suzuki, Y. Hayashizaki, I. Jurisica, and J. L. Wrana, "High-Throughput Mapping of a Dynamic Signaling Network in Mammalian Cells," *Science*, volume 307, number 5715, pages 1621-1625, 2005.

J6 **N. Pržulj** and D. G. Corneil, "2-tree Probe Interval Graphs Have a Large Obstruction Set," *Discrete Applied Mathematics*, volume 150, number 1-3, pages 216-231, 2005.

J5 **N. Pržulj**, D. G. Corneil, and I. Jurisica, "Modeling Interactome: Scale-Free or Geometric?," *Bioinformatics*, volume 20, number 18, pages 3508-3515, 2004.

J4 A. D. King, **N. Pržulj**, and I. Jurisica, "Protein complex prediction via cost-based clustering," *Bioinformatics*, volume 20, number 17, pages 3013 - 3020, 2004.

J3 **N. Pržulj**, D. Wigle, and I. Jurisica, "Functional Topology in a Network of Protein Interactions," *Bioinformatics*, volume 20, number 3, pages 340-348, 2004.

J2 **N. Pržulj**, D. G. Corneil, and E. Koehler, "Hereditary Dominating Pair Graphs," *Discrete Applied Mathematics*, volume 134, pages 239-261, 2004.

J1 A. L. Liestman and **N. Pržulj**, "Minimum Average Time Broadcast Graphs," *Par. Proc. Lett.*, volume 8, pages 139-147, 1998.

Refereed Book Chapter:

B1 **N. Pržulj**, "Graph Theory Analysis of Protein-Protein Interactions," a chapter in *Knowledge Discovery in Proteomics*, edited by Igor Jurisica and Dennis Wigle, CRC Press, 2005.

Invited Talks:

1. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," University of Glasgow, Computing Science Seminar, Glasgow, UK, October 20, 2006.
2. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," University of Strathclyde, Mathematics Colloquium, Glasgow, UK, October 18, 2006.
3. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," Max Planck Institute for Molecular Genetics, Berlin, Germany, September 28, 2006.
4. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," University of Bremen, Germany, September 26, 2006.
5. **N. Pržulj**, "Protein-Protein Interaction Networks: Issues, Models, and Comparisons," The Foundation for Research and Technology – Hellas (FORTH) Research Center, Heraklion, Greece, September 14, 2006.
6. **N. Pržulj**, "Protein-Protein Interaction Networks: Issues, Models, and Comparisons," International mathematical conference: *Topics in Mathematical Analysis and Graph Theory (MAGT'06)*, Belgrade, Serbia, September 1-4, 2006.
7. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," The Institute of Physics, University of Belgrade, Belgrade, Serbia, August 29, 2006.
8. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," Petnica Research Station, Serbia, August 26, 2006.
9. **N. Pržulj**, "Comparing and Modeling Protein-Protein Interaction Networks," Workshop on *Algorithms in Bioinformatics (AlBio'06)*, Moscow, Russia, July 11-13, 2006.
10. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example," *Simon Fraser University*, Vancouver, Canada, December 14, 2005.
11. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example," *University of Victoria*, Victoria, Canada, December 13, 2005.
12. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example," *University of British Columbia*, Vancouver, Canada, December 12, 2005.

13. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example," *Institute of Physics, University of Belgrade*, Zemun, Serbia and Montenegro, September 14, 2005.
14. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example," *BMC Research Center, RIKEN*, Nagoya, Japan, May 24, 2005.
15. **N. Pržulj**, "Analyzing Large Biological Networks: Protein-Protein Interaction Example", *Computer Science Department, UC Riverside*, Riverside, CA, April 25, 2005.
16. **N. Pržulj**, "Analyzing Software Call Graphs," *Microsoft Research, Redmond*, WA, August 22, 2003.
17. **N. Pržulj**, D. Wigle, and I. Jurisica, "Functional Topology in a Network of Protein Interactions," *BioPathways*, *ISMB'03*, Brisbane, Australia, June 27 - 28, 2003.

Contributed Talks:

18. **N. Pržulj**, "Biological network comparison using graphlet degree distributions," 3rd International Symposium on Networks in Bioinformatics (ISNB'06), acceptance rate 20%, Amsterdam, the Netherlands, May 29-31, 2006.
19. **N. Pržulj**, "Uncovering Structure in Protein-Protein Interaction Networks," *BioPathways*, a Satellite Conference of *ISMB'05*, Detroit, Michigan, June 23 - 24, 2005.
20. **N. Pržulj**, D. G. Corneil, and I. Jurisica, "Geometric Model of Protein Interaction Networks," *CNET 2004*, University of Aveiro, Portugal, August 29 - September 2, 2004.
21. **N. Pržulj** and D. G. Corneil, "2-tree probe interval graphs have a large obstruction set," *12th Ontario Combinatorics Workshop*, University of Ottawa, May 1-2, 2003.
22. **N. Pržulj**, G. Lee, and I. Jurisica, "Functional Analysis of Large Software Networks," *IBM Academy: Proactive Problem Prediction, Avoidance and Diagnosis*, IBM T.J. Watson Research Center, Yorktown, NY, April 28-29, 2003.
23. **N. Pržulj**, "Minimal Hereditary Dominating Pair Graphs," *Workshop on Structured Families of Graphs*, The Fields Institute, May 8-13, 2000.
24. **N. Pržulj**, "Minimal Hereditary Dominating Pair Graphs," *Special Year on Graph Theory and Combinatorial Optimization Program Seminar Series*, The Fields Institute, March 22, 2000.
25. A. L. Liestman and **N. Pržulj**, "Minimum Average Time Broadcast Graphs," *27th SE International Conference on Combinatorics, Graph Theory, and Computing*, Boca Raton, Florida, March, 1997.

Exhibits (Refereed):

26. **N. Pržulj**, "Biological Network Comparison Using Graphlet Degree Distributions," a poster at *ISMB* 2006, Fortaleza, Brazil, August 6-10, 2006.
27. S. Zhou and **N. Pržulj**, "Do Protein-Protein Interaction Networks Look Like a Jelly-Fish?" a poster at *ISMB 2006*, Fortaleza, Brazil, August 6-10 2006.
28. **N. Pržulj**, D. G. Corneil, and I. Jurisica, "Geometric Properties of Protein-Protein Interaction Networks," a poster at *ISMB/ECCB 2004*, Glasgow, UK, July 31 - August 4, 2004.
29. **N. Pržulj** and I. Jurisica, "A Call Graph Analysis," a poster at *CASCON 2003*, Markham, Ontario, Canada, October 6-9, 2003.

30. **N. Pržulj**, D. Wigle, and I. Jurisica, "Functional Topology in a Network of Protein Interactions," poster at *ISMB 2003*, Brisbane, Australia, June 29 - July 3, 2003.

## Academic Service:

**Government Panel**: An NSF panelist at a Panel of CISE SEII program, Arlington, VA, 2006.

**Journal Paper Reviewer**: *Algorithms for Molecular Biology* (BioMed Central), *Bioinformatics* (Oxford Journals), *BMC Bioinformatics* (BioMed Central), *Cancer Informatics* (Libertas Academica), *Discrete Mathematics* (Elsevier), *Discrete Applied Mathematics* (Elsevier), *Genome Biology* (BioMed Central).

**Conference Paper Reviewer**: The 14th annual international conference on *Intelligent Systems for Molecular Biology (ISMB)* 2006. *Pacific Symposium on Biocomputing (PSB)* 2007.

**Committee Member**: Computing Committee, ICS, UCI, 2005/06.

**President**: Computer Science Graduate Student Society, U of T, 2000-2002.

**Executive member**: Computer Science Graduate Student Society, U of T, 1998-2004.

**Graduate Student Representative**: Graduate Committee, Department of Computer Science, U of T, 1998-2001.

**President**: International Students' Club, Simon Fraser University, 1995-1996.

## Teaching:

**Taught Graduate Courses**:

* I&C SCI 265 Graph Algorithms, ICS, UCI, Winter 2006.
  - Enrollment: 7 students.
  - Student Evaluations – Overall Median: 6.33 (on 0-9 scale); 3 students responded.
* I&C SCI 280 Biological Networks, ICS, UCI, Winter 2006.
  - Enrollment: 7 students.
  - Student Evaluations – Overall Mean: 7.71 (on 0-9 scale); 7 students responded.
* I&C SCI 299: Individual Study, ICS, UCI, Spring 2006.
  - Enrollment: 1 student.

**Taught Undergraduate Course**:

* I&C SCI 199: Individual Study, ICS, UCI, Spring 2006.
  - Enrollment: 1 student.

**Developed a New Graduate Course**:

* I&C SCI 288 Biological Networks, ICS, UCI, to be offered in Winter 2007.

## Student Supervision:

**Graduate Students**:

* Hania El Ayoubi (U. of Toronto), April 2006 – present.
* Hironmey Basu (UCI), March-June 2006.
* Jing-Jing Li (UCI), September 2006 – present.
* Tijana Milenkovic (UCI), September 2006 – present.

**Undergraduate Students**:

* David Hubin, March 2006 – present. Recepient of SURP UCI award, Summer 2006.
* Jason Lai, October 2005 – present.

**High-School Student**:

* Stefan Covic, May 2006- present.

## Experience

**Assistant Professor**, Department of Computer Science, UC Irvine, Irvine, CA, USA.
July 2005 – present.

**Postdoctoral Fellow**, Samuel Lunenfeld Research Institute, Toronto, ON, Canada.
March 2005 – June 2005.
Supervisor: Jeff Wrana.
- I analyze and model protein-protein interaction networks. My models are used to guide biological experiments for identifying protein-protein interactions.

**Research Assistant**, Banting and Best Institute, University of Toronto, ON, Canada.
Sept 2002 - May 2003.
- I analyzed large networks of protein interactions using novel graph-theoretic approaches.

**Teaching Assistant and Substitute Instructor**, University of Toronto, ON, Canada.
May 1999 - May 2002
- I gave lectures, tutorials, and office hours, marked assignments, supervised and marked exams for the following courses:

*First year course*:
Teaching Assistant and Substitute Instructor: CSC 199 Beautiful Algorithms, Fall 2001 and Spring 2002.

*Second year course*:
Teaching Assistant: CSC 238 Discrete Mathematics, Summer 1999 and Summer 2001.

*Third year course*:
Teaching Assistant: MATC32 Graph Theory and Algorithms, University of Toronto at Scarborough, Fall 2000.

*Graduate course*:
Teaching Assistant: CSC 2414 Topics in Applied Discrete Mathematics: Analysis of Algorithms, Spring 2002.

**Visiting PhD Student**, The Fields Institute, Toronto, ON, Canada.
Jan 2000 - Dec 2000.

**Programming Consultant**, Westech Information Systems, Vancouver, BC, Canada.
May 1997 - Aug 1998.
- I worked full-time as a programming consultant on the GIS Smallworld team, and provided programming services for object oriented AM/FM/GIS systems on the Windows NT platform. I developed Object Oriented GUI GIS utility applications in Smallworld Magik, translated data from GFIS to Smallworld, installed an Oracle Server and made an interface between Oracle and Smallworld applications. I also performed System Administration GIS tasks such as image building and maintenance.

**Research Assistant**, Simon Fraser University, Burnaby, BC, Canada.
Sept 1996 - Dec 1996 and Sept 1997 - Dec 1997.
- I worked under the supervision of Prof. A. Liestman on network broadcasting problems. Our research resulted in the paper "Minimum Average Time Broadcast Graphs", Parallel Processing Letters, volume 8, pages 139-147, 1998.

**Teaching Assistant**, Simon Fraser University, Burnaby, BC, Canada.
Jan 1996 - Apr 1996.
- MAT 154, 155, 157, 158 Applied Calculus Courses. I held office hours, explained mathematical problems to students, marked homework, supervised and marked exams.

**Quality Assurance Engineer**, Hughes Aircraft of Canada Ltd., Richmond, BC, Canada.
May 1995 - Aug 1995.
- I reviewed and approved documents of all phases of software development, participated in meetings conducted to approve software development phases, and wrote a proprietary document entitled "Metrics Collections Instructions" for monitoring the progress of the Canadian Automated Air Traffic Control System project as part of my Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Undergraduate Student Research Award. The document was approved by Dr. K. Toth, the Quality Assurance Director, and subsequently included in the company's formal procedures. It has been used by Quality Assurance Engineers both weekly and monthly as a guide for metrics collections on the Canadian Automated Air Traffic Control System project.

## Awards and Distinctions

Council on Research, Computing and Library Resources (CORCLR) Grant, UCI, 2006.
U of T Arts and Sciences Fellowship, University of Toronto, Winter 2004.
OGS (Ontario Graduate Scholarship), University of Toronto, Jan - Dec 2004.
IBM CAS (Center for Advanced Studies) Ph.D. Fellowship, U of T, Jan - Dec 2003.
NSERC Postgraduate Scholarship A, University of Toronto, 1999-2001.
OGS (Ontario Graduate Scholarship), University of Toronto, 1998-1999.
Computer Science Graduate Entrance Award, University of Toronto, 1998-1999.
SFU Undergraduate Open Scholarship, Simon Fraser University, Spring 1997.
SFU Alumni Scholarship, Simon Fraser University, Spring 1997.
India Club Scholarship, Simon Fraser University, Spring 1997.
SFU Undergraduate Open Scholarship, Simon Fraser University, Fall 1996.
SFU Undergraduate Open Scholarship, Simon Fraser University, Summer 1996.
SFU Undergraduate Open Scholarship, Simon Fraser University, Spring 1996.
SFU Alumni Scholarship, Simon Fraser University, Spring 1996.
Motorola Wireless Data Group Scholarship, Simon Fraser University, Fall 1995.
SFU Undergraduate Open Scholarship, Simon Fraser University, Fall 1995.
NSERC Industrial Undergraduate Student Research Award, Hughes Aircraft, Summer 1995.
SFU Alumni Scholarship, Simon Fraser University, Spring 1995.
Hughes Aircraft of Canada Scholarship, Simon Fraser University, Fall 1994.
Ministry of Education Scholarship, University of Belgrade, Yugoslavia, 1992-1993.

## Affiliations

International Society for Computational Biology (ISCB),
Society for Industrial and Applied Mathematics (SIAM),
American Physical Society (APS).

## References

Available upon request.