

# Curriculum Vitae of Gregory Butler

## 1 September 2022

Professor, Department of Computer Science and Software Engineering, Concordia University  
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### Employment

1992–now: Computer Science and Software Engineering, Concordia University, Montreal, Canada  
1999–now: Full Professor  
1992–1999: Associate Professor — tenure in 1995  
January–May 1992: Limited-Term Associate Professor

1981–1990: Computer Science, University of Sydney, Sydney, Australia  
1987–1990: Senior Lecturer  
1981–1987: Lecturer — tenure in 1983

1980/81: Postdoctoral Fellow, Computer Science, Concordia University  
1979/80: Postdoctoral Fellow, jointly in Department of Mathematics, McGill University and  
Department of Computer Science, Concordia University  
Supervisors: Dr Hans Schwerdtfeger and Dr John McKay

### Education

PhD: Pure Mathematics, University of Sydney, 1980  
Thesis: Computational Approaches to Certain Problems in the Theory of Finite Groups.  
Supervisor: Dr John J. Cannon

BSc (First Class Honours): Pure Mathematics, University of Sydney, 1976

### Awards and Distinctions

Founding Director, Data Science Research Centre (2015).

Co-founder of Centre for Structural and Functional Genomics, Concordia University (1998).

Founding member of the Canadian Semantic Web Interest Group (SWIG) (2005–now).

Member of the International Society for Computational Biology (ISCB) (1998–now).

Invited Speaker, Algebraic Combinatorics and Applications Conference, in honour of 60th birthday of Professor Reinhard Laue, Thurnau, Germany, 2005.

Invited Speaker, Distinguished Seminar Series, School of Computing, Queens University, 2004.

Second prize, Semantic Web Challenge, Fourth International Semantic Web Conference, 2005, for the FungalWeb Ontology (Arash Shaban-Nejad, Christopher Baker, Volker Haarslev, Greg Butler).

Commonwealth Postgraduate Research Award, 1976–1979, Australia, for postgraduate studies.

Deutscher Akademischer Austauschdienst Travelling Scholarship, 1976 (declined).

Barker Scholarship No. II in Mathematics 1973 (shared) for best student in first-year mathematics at the University of Sydney.

Commonwealth University Scholarship Scheme, 1972–1973, Australia, for undergraduate studies.

Commonwealth Secondary Scholarship, 1970–1971, Australia.

## Publications

**bold** denotes a student co-author. *italics* denotes a postdoctoral fellow co-author.

### Lifetime Publications

Monographs	5
Journal papers (refereed)	50
Conference papers (refereed)	101
Technical reports	23
Other	15

### Lifetime Patents

Patents (PCT)	16
Patents (Provisional)	23
Declarations of Invention	30

### Google Scholar Statistics

Citation indices	All	Since 2017
Citations	3602	1022
h-index	28	13
i10-index	65	14

## Papers in Refereed Journals

**J-50. Stuart Thiel**, Larry Thiel and Gregory Butler, *ThielSort: Implementing the Diverting Fast Radix Algorithm*, submitted ACM Journal of Experimental Algorithmics, August 2022.

<https://doi.org/10.48550/arXiv.2207.14334>

**J-49. Munira Alballa** and Gregory Butler, *TooT-TSC: Predicting Eleven Substrate Classes of Transmembrane Transport Proteins*, in progress, BMC Bioinformatics, January 2022.

doi: <https://doi.org/10.1101/2022.01.25.477715>

**J-48. Stephanie Kamgnia Wonkap** and Gregory Butler, *BENIN: Biologically enhanced network inference*, Journal of Bioinformatics and Computational Biology (2020) Vol. 18, No. 03, 2040007.

<https://doi.org/10.1142/S0219720020400077>

**J-47. Munira Alballa** and Gregory Butler, *Integrative approach for detecting membrane proteins*, BMC Bioinformatics 21, 575 (2020). <https://doi.org/10.1186/s12859-020-03891-x>

**J-46. Munira Alballa** and Gregory Butler, *TooT-T: Discrimination of transport proteins from non-transport proteins*, BMC Bioinformatics 21, 25 (2020). <https://doi.org/10.1186/s12859-019-3311-6>

**J-45. Munira Alballa**, Faizah Aplop and Gregory Butler, *TranCEP: Predicting the substrate class of transmembrane transport proteins using composition, evolutionary, and positional information*, PLoS ONE (2020) 15(1): e0227683. <https://doi.org/10.1371/journal.pone.0227683>

- J-44. Faizah Aplop** and Gregory Butler, *Metabolic Pathway Reconstruction of Fungal Genomes*, *Advanced Science Letters* 23:4 (April 2017) 3796-3801.
- J-43. Faizah Aplop** and Gregory Butler, *TransATH: Transporter Prediction via Annotation Transfer by Homology*, *ARNP Journal of Engineering and Applied Sciences*, Vol. 12 No. 2 (January) 2017
- J-42. Kasra Zandi**, Gregory Butler, Nawwaf Kharma, *An Adaptive Defect Weighted Sampling Algorithm to Design Pseudoknotted RNA Secondary Structures*, *Frontiers in Genetics*, 22 July 2016, 20 pages.
- J-41.** Kimchi Strasser, Erin McDonnell, Carol Nyaga, Min Wu, Sherry Wu, **Hayda Almeida**, Marie-Jean Meurs, Leila Kosseim, Justin Powlowski, Greg Butler, Adrian Tsang *mycoCLAP, the database for characterized lignocellulose-active proteins of fungal origin: resource and text mining curation support*, *Database* 2015, bavt008. Impact Factor 4.5.
- J-40. Hayda Almeida**, Marie-Jean Meurs, Leila Kosseim, Gregory Butler, Adrian Tsang, *Machine Learning for Biomedical Literature Triage*, *PLoS ONE* 9:12 (2014) e115892 Impact Factor 3.23
- J-39.** Ian Reid, Nicholas O'Toole, Omar Zabaneh, Reza Nourzadeh, Mahmoud Dahdouli, Mostafa Abdellateef, Paul MK Gordon, Jung Soh, Gregory Butler, Christoph W Sensen, Adrian Tsang, SnowyOwl: accurate prediction of fungal genes by using RNA-Seq and homology information to select among *ab initio* models, *BMC Bioinformatics* **15**(1) (2014) 229. Impact Factor 2.67
- J-38.** Thomas Triplet and Gregory Butler, A review of genomic data warehousing systems, *Briefings in Bioinformatics* **15**:4 (2014) 471–483 impact Factor 5.202
- J-37. Bahman Zamani** and Gregory Butler, Pattern Language Verification in Model Driven Design, *Information Sciences*, **237**, 10 July 2013, 343–355. Impact Factor 2.83
- J-36.** Marie-Jean Meurs, **Caitlin Murphy**, Ingo Morgenstern, Greg Butler, Justin Powlowski, Adrian Tsang, René Witte, Semantic Text Mining for Lignocellulose Research, *BMC Medical Informatics and Decision Making*, 2012, **12**, Suppl.1, pp.S5. Impact Factor 2.23
- J-35.** Thomas Triplet and Gregory Butler, The EnzymeTracker: A open-source laboratory information management system for sample tracking, *BMC Bioinformatics* 2012, **13**:15 doi:10.1186/1471-2105-13-15. Impact Factor 3.03
- J-34. Jianlong Qi**, Tom Michoel and Gregory Butler, An integrative approach to infer regulation programs in a transcription regulatory module network, *Journal of Biomedicine and Biotechnology*, **2012** (2012), Article ID 245968, 8 pages. doi:10.1155/2012/245968 Impact Factor 2.71
- J-33.** R.M. Berka, I.V. Grigoriev, R. Otilar, A. Salamov, J. Grimwood, I. Reid, N. Ishmael, T. John, C. Darmond, M.-C. Moisan, B. Henrissat, P.M. Coutinho, V. Lombard, D. Natvig, E. Lindquist, J. Schmutz, S. Lucas, P. Harris, J. Powlowski, A. Bellemare, D. Taylor, G. Butler, R.P. de Vries, I.E. Allijn, J. van den Brink, S. Ushinsky, R. Storms, A.J. Powell, I.T. Paulsen, L.D.H. Elbourne, S.E. Baker, J. Magnuson, S. LaBoissiere, A.J. Clutterbuck, D. Martinez, M. Wogulis, A. Lopez de Leon, M.W. Rey, A. Tsang, Comparative Genomic Analysis of the Thermophilic Biomass-Degrading Fungi *Myceliophthora thermophila* and *Thielavia terrestris*, *Nature Biotechnology* **29**, 922–927 (2011). JCR 2013 Impact Factor 39.0.

- J-32. C. Murphy**, J. Powlowski, M. Wu, G. Butler, A. Tsang, Curation of Characterized Glycoside Hydrolases of Fungal Origin, *Database: J. Biological Databases & Curation*, 2011. JCR 2013 Impact Factor 4.5.
- J-31. M. Qi, P. Wang**, N. OToole, P. S Barboza, E. Ungerfeld, M. B. Leigh, B. Selinger, G. Butler, A. Tsang, T. McAllister, R. Forster, Snapshot of the eukaryotic gene expression in muskoxen rumen—A metatranscriptomic approach, *PLoS ONE:Research Article*, published 31 May 2011 JCR 2010 Impact Factor 4.4.
- J-30. B. Zamani**, G. Butler, Smell Detection in UML Designs which Utilize Pattern Languages, *Iranian Journal of Electrical and Computer Engineering*, Vol **8**, No 1 Winter 2009, pp.47–52.
- J-29.** A. Tsang, G. Butler, J. Powlowski, E. Panisko, S. Baker, Analytical and computational approaches to define the *Aspergillus niger* secretome, *Fungal Genet Biol.* 2009;**46** Suppl 1:S153–S160. JCR 2010 Impact Factor 3.3.
- J-28. B. Zamani**, G. Butler, **S. Kayhani**, Tool Support for Pattern Selection and Use, *Electr. Notes Theor. Comput. Sci.* **233**: 127-142 (2009)
- J-27. C. J. O. Baker, R. H. Warren**, V. Haarslev, G. Butler, The Ecology of Ontologies in the Public Domain, *The Monist* (An International Quarterly Journal of General Philosophical Inquiry), Vol. **90**, Issue 4, October 2007: Biomedical Ontologies
- J-26. N. O’Toole, X.J. Min**, G. Butler, R. Storms, A. Tsang, Sequence-based analysis of fungal secretomes. *Applied Mycology and Biotechnology* **6**, (2006) 277–296.
- J-25. C. J.O Baker, A. Shaban-Nejad, X. Su**, V. Haarslev, G. Butler. Semantic web infrastructure for fungal enzyme biotechnologists. *Journal of Web Semantics*, **4**, 3 (2006) 168–180. JCR 2010 Impact Factor 2.7.
- J-24. N. Semova**, R. Storms, T. John, **P. Gaudet**, P. Ulyczynj, *X. J. Min, J. Sun*, G. Butler, A. Tsang, Generation, annotation, and analysis of an extensive *Aspergillus niger* EST collection, *BMC Microbiology* 2006, **6**:7 JCR 2010 Impact Factor 2.9.
- J-23.** C. W.H. Lam, G. Butler, **K.L. Ma**, K. Loeschner, Constructing Covering Codes via Automorphisms, *Bayreuther Mathematischen Schriften* **74** (2005) 221–232.
- J-22. X. J. Min**, G. Butler, R. Storms, A. Tsang, OrfPredictor: predicting protein-coding regions in EST-derived sequences, *Nucl. Acids Res.* 2005 **33**: W677-W680. JCR 2010 Impact Factor 7.8.
- J-21. X. J. Min**, G. Butler, R. Storms, A. Tsang, TargetIdentifier: a webserver for identifying full-length cDNAs from EST sequences, *Nucl. Acids Res.* 2005 **33**: W669-W672. JCR 2010 Impact Factor 7.8.
- J-20.** Greg Butler, **Andrea Gantchev**, Peter Grogono, Object-Oriented Design of the Subsumption Architecture, *Software — Practice and Experience*, **31** (2001) 911–923. JCR 2010 Impact Factor 0.57.
- J-19.** G. Butler, R.K. Keller, H. Mili, A framework for framework documentation, *ACM Computing Surveys* **32**,1 (March 2000) electronic symposium. JCR 2010 Impact Factor 8.0.
- J-18.** G. Butler, Easy verification of behavioural subtyping in common cases, *Information Processing Letters* **55** (1995) 57–58. JCR 2010 Impact Factor 0.61.

- J-17.** F. Ng, G. Butler and J. Kay, An intelligent tutoring system for the Dijkstra-Gries methodology, *IEEE Transactions on Software Engineering* **21**, 5 (May 1995) 415–428. JCR 2010 Impact Factor 2.2.
- J-16.** G. Butler and S. S. Iyer, An experimental knowledge base of simple groups, *Australian Journal of Intelligent Information Processing Systems* **2**, 1 (1995) 11–23.
- J-15.** G. Butler, S.S. Iyer, and E.A. O’Brien, A database of groups of prime-power order, *Software — Practice and Experience* **24**, 10 (October 1994) 911–951. JCR 2010 Impact Factor 0.57.
- J-14.** G. Butler, An inductive schema for computing conjugacy classes in permutation groups, *Mathematics of Computation* **62**, 205 (January 1994) 363–383. JCR 2010 Impact Factor 1.3.
- J-13.** G. Butler, The transitive groups of degree fourteen and fifteen, *Journal of Symbolic Computation* **16**, 5 (November 1993) 413–422. JCR 2010 Impact Factor 0.84.
- J-12.** G. Butler and J.J. Cannon, On Holt’s algorithm, *Journal of Symbolic Computation* **15**, 2 (February 1993) 229–233. JCR 2010 Impact Factor 0.84.
- J-11.** G. Butler and J.J. Cannon, Computing Sylow subgroups of permutation groups using homomorphic images of centralizers, *Journal of Symbolic Computation* **12** (1991) 443–457. JCR 2010 Impact Factor 0.84.
- J-10.** G. Butler and J.J. Cannon, Computing in permutation and matrix groups III : Sylow subgroups, *Journal of Symbolic Computation* **8**, 3 (1989) 241–252. JCR 2010 Impact Factor 0.84.
- J-9.** G. Butler, A proof of Holt’s algorithm, *Journal of Symbolic Computation* **5** (1988) 275–283. JCR 2010 Impact Factor 0.84.
- J-8.** G. Butler and M.J. Kendall, The suitability for master/slave concurrency of Concurrent Euclid, Ada, and Modula, *Software — Practice and Experience* **17**, 2 (1987) 117–134. JCR 2010 Impact Factor 0.57.
- J-7.** G. Butler and C.W.H. Lam, A general backtrack algorithm for the isomorphism problem of combinatorial objects, *Journal of Symbolic Computation* **1**, 4 (1985) 363–381. JCR 2010 Impact Factor 0.84.
- J-6.** G. Butler, Effective computation with group homomorphisms, *Journal of Symbolic Computation* **1**, 2 (1985) 143–157. JCR 2010 Impact Factor 0.84.
- J-5.** G. Butler and J. McKay, The transitive groups of degree up to eleven, *Communications of Algebra* **11**, 8 (1983) 863–911. JCR 2010 Impact Factor 0.37.
- J-4.** G. Butler, Computing normalizers in permutation groups, *Journal of Algorithms* **4** (1983) 163–175.
- J-3.** G. Butler, Computing in permutation and matrix groups II : backtrack algorithm, *Mathematics of Computation* **39**, 160 (1982) 671–680. JCR 2010 Impact Factor 1.3.
- J-2.** G. Butler and J.J. Cannon, Computing in permutation and matrix groups I : normal closure, commutator subgroup, series, *Mathematics of Computation* **39**, 160 (1982) 663–670. JCR 2010 Impact Factor 1.3.
- J-1.** G. Butler, The maximal subgroups of the sporadic simple group of Held, *Journal of Algebra* **69**, 1 (1981) 67–81. JCR 2010 Impact Factor 0.62.

## Refereed Conference Papers

**C-101 Hamed Ghazikhani** and Gregory Butler, *TooT-BERT-C: A Study on Discriminating Ion Channels from Membrane Proteins based on the Primary Sequence's Contextual Representation from BERT Models*, 9th International Conference on Bioinformatics Research and Applications (ICBRA 2022), 18-20 September 2022, Berlin, Germany.

**C-100 Hamed Ghazikhani** and Gregory Butler, *TooT-BERT-T: A BERT approach on discriminating transport proteins from non-transport proteins*, 16th International Conference on Practical Applications of Computational Biology & Bioinformatics (PACBB 2022) 13th-15th July, 2022, L'Aquila, Italy.

**C-99 Sima Ataei** and Gregory Butler, *Predicting the specific substrate for transmembrane transport proteins using a BERT language model*, 19th IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2022), Ottawa, 15-17 August 2022.

**C-98 Hamed Ghazikhani** and Gregory Butler, *TooT-BERT-M: Discriminating membrane proteins from non-membrane proteins using a BERT representation of protein primary sequences*, 19th IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2022), Ottawa, 15-17 August 2022.

**C-97. Shiva Shamloo, Qing Ye** and Gregory Butler *TportHMM: Predicting the substrate class of transmembrane transport proteins using profile Hidden Markov Models*, 2020 IEEE International Conference on Bioinformatics and Biomedicine (IEEE BIBM 2020), 2020, Virtual Event, South Korea, December 16-19, 2020, pp. 2812–2817.

**C-96. Munira Alballa** and Gregory Butler, *Ontology-based transporter substrate annotation for benchmark datasets*, 2019 IEEE International Conference on Bioinformatics and Biomedicine (IEEE BIBM 2019), November 18-21, 2019, San Diego, CA, USA, pp. 2613–2619.

**C-95. Munira Alballa** and Gregory Butler, *Combinational approach to detect membrane proteins*, NETTAB/BCC 2019. joint NETTAB and Bioinformatics and Computational Biology Conference, Fisciano Campus, University of Salerno, Italy, November 11-13, 2019.

**C-94. Stephanie Kamgnia Wonkap** and Gregory Butler, *BENIN: Combining knockout gene expression data with time series gene expression for the gene regulatory network inference*, submitted to The 10th International Conference on Computational Systems-Biology and Bioinformatics (CSBio 2019), Nice (France), December 4 to 7, 2019.

**C-93. Christine Kehyayan** and Greg Butler, *SynAPhy and SynAVal: Mining a Synteny-Similarity Graph to Resolve Orthology of Proteins in Fungal Genomes*, BIBE 2017, 17th IEEE International Conference on Bioinformatics and Bioengineering, October 23–25, 2017, Washington DC, USA.

**C-92. Faizah Aplop** and Gregory Butler, *TransATH: Transporter Prediction via Annotation Transfer by Homology*, 4th International Conference on Advances in Intelligent Systems in Bioinformatics, Chem-Informatics, Business Intelligence, Social Media and Cybernetics 2016 (InteliSys 2016), Bandung, Indonesia, 20–21 August 2016.

**C-91. Faizah Aplop** and Gregory Butler, *Metabolic Pathway Reconstruction of Fungal Genomes*, 4th International Conference on Advances in Intelligent Systems in Bioinformatics, Chem-Informatics,

Business Intelligence, Social Media and Cybernetics 2016 (InteliSys 2016), Bandung, Indonesia, 20–21 August 2016.

**C-90.** **Stuart Thiel**, Greg Butler, Larry Thiel, *Improving GraphChi for Large Graph Processing: Fast Radix Sort in Pre-Processing*, 20th International Database Engineering & Applications Symposium, IDEAS '16, Montreal, Canada, July 11-13.

**C-89.** **Faizah Aplop** and Greg Butler, *On predicting transport proteins and their substrates for the reconstruction of metabolic networks*, IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2015), Niagara falls, Canada, 12–15 August 2015.

**C-88.** **Nada Alhirabi** and Greg Butler, *A Visual Spreadsheet using HTML5 for Whole Genome Display*, IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2015), Niagara falls, Canada, 12–15 August 2015.

**C-87.** Greg Butler *Position paper: Computation for Genomics Knowledge Discovery*, 1st IEEE/ACM International Workshop on Software Engineering for High Performance Computing in Science, SE4HPCS 2015, Florence, Italy, May 18, 2015, pages 46–50.

**C-86.** **Lin Cheng** and Gregory Butler, *Accelerating Search of Protein Sequence Databases using CUDA-Enabled GPU*. Database Systems for Advanced Applications, 2015, pp 279–298

**C-85.** Fedor Bakalov, *Marie-Jean Meurs*, Birgitta König-Ries, Bahar Sateli, René Witte, Gregory Butler and Adrian Tsang, *An Approach to Controlling User Models and Personalization Effects in Recommender Systems*, International Conference on Intelligent User Interfaces (IUI 2013), Santa Monica, CA USA March 19-22, 2013. pp 49–56 pages 49-56, ACM, ISBN 978-1-4503-1965-2

**C-84.** Hind Melhem, Xiang Jia Min and Gregory Butler, *The Impact of SignalP 4.0 on the Prediction of Secreted Proteins*, 10th annual IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2013), 15–19 April 2013, Singapore. IEEE. pp. 16–22.

**C-83.** Gregory Butler, *Putting It All Together: The Design of a Pipeline for Genome-Wide Functional Annotation of Fungi in the Modern Era of “-Omics” Data and Systems Biology*, Proceedings of 9th International Conference, DILS 2013, Montreal, Canada, July 11-12, 2013, Series: Lecture Notes in Computer Science, Vol. **7970** pp.113–127.

**C-82.** *Thomas Triplet* and Gregory Butler, *BenchDW: a generic framework for biological data warehouse benchmarking*, 28th ACM Symposium On Applied Computing (SAC 2013), March 18 – 22, 2013, Coimbra, Portugal. pp.1328–1334

**C-81.** Bahar Sateli, *Marie-Jean Meurs*, Gregory Butler, Justin Powlowski, Adrian Tsang and René Witte, *IntelliGenWiki: An Intelligent Semantic Wiki for Life Sciences*, NETTAB 2012 workshop focused on Integrated Bio-Search November 14-16, 2012, Como, Italy. pp.50–52.

**C-80.** Fedor Bakalov, *Marie-Jean Meurs*, Birgitta König-Ries, René Witte, Greg Butler, Justin Powlowski, Adrian Tsang, *Personalized Semantic Assistance for Curation of Biochemical Literature*, IEEE International Conference on Bioinformatics and Biomedicine (BIBM) 2012 October 4-7, 2012, Philadelphia. pp.503–506.

**C-79.** **Jun Luo** and Gregory Butler, *ECTree: An Extended Tree Index For Attributed Subgraph Queries*, 16th International Database Engineering & Applications Symposium, 2012, 216–221.

- C-78.** *Marie-Jean Meurs*, Caitlin Murphy, *Ingo Morgenstern*, **Nona Naderi**, Greg Butler, Justin Powlowski, Adrian Tsang, René Witte, *Semantic Text Mining for Lignocellulose Research*, accepted to ACM Fifth International Workshop on Data and Text Mining in Biomedical Informatics, Glasgow, 24th October 2011.
- C-77.** *Marie-Jean Meurs*, Caitlin Murphy, **Nona Naderi**, *Ingo Morgenstern*, **Carolina Cantu**, *Shary Semarjit*, Greg Butler, Justin Powlowski, Adrian Tsang, René Witte, *Towards Evaluating the Impact of Semantic Support for Curating the Fungus Scientific Literature*, Third Canadian Semantic Web Symposium, Vancouver, August 5, 2011.
- C-76.** **Jianlong Qi**, Tom Michoel and Gregory Butler, *An integrative approach to infer regulation programs in a transcription regulatory module network*, ACM Conference on Bioinformatics, Computational Biology and Biomedicine 2011, August 1–3, 2011 Chicago.
- C-75.** **Stephen C. Barrett**, Greg Butler, Patrice Chalin, *Table-Driven Detection and Resolution of Operation-Based Merge Conflicts with Mirador*, 7th European Conference on Modelling Foundations and Applications, Birmingham, UK, June 6–9, 2011, pp. 329–344.
- C-74.** *Thomas Triplet*, Justin Powlowski, Adrian Tsang and Gregory Butler, *A web-based system for sample tracking with customizable reports*, 3rd International Conference on Bioinformatics, Biocomputational Systems and Biotechnologies, Venice, May 22–27, 2011.
- C-73.** **Jianlong Qi**, Tom Michoel and Gregory Butler, *Applying linear models to learn regulation programs in a transcription regulatory module network*, 9th European Conference on Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics, 27–29 April 2011 Torino, Italy.
- C-72.** *Thomas Triplet* and Greg Butler, *Systems Biology Warehousing: Challenges and Strategies toward Effective Data Integration*, The Third International Conference on Advances in Databases, Knowledge, and Data Applications, Friedrich Laux and Lena Strömbäck, eds, IARIA, 2011, pages 34–40, ISBN:978-1-61208-002-4
- C-71.** **Stephen C. Barrett**, Greg Butler, Patrice Chalin, *Decoupling Operation-Based Merging from Model Change Recording*, Preliminary Proceedings of International Workshop on Models and Evolution, 13th International Conference on Model Driven Engineering Languages and System, October 3, 2010, Oslo, Norway.
- C-70.** **Stephen C. Barrett**, Greg Butler, Patrice Chalin, *Mirador: a synthesis of model matching strategies*, Proceedings of the 1st International Workshop on Model Comparison in Practice 2010 ISBN: 978-1-60558-960-2
- C-69.** **Stephen C. Barrett**, Greg Butler, Patrice Chalin, *Techniques for use case modeling in Fujaba*, 2nd Internat. Conf. on Computer Engineering and Technology, IEEE 2010, pages V1-487 – V1-491
- C-68.** **Jianlong Qi**, Tom Michoel and Gregory Butler, *A Regression Tree-Based Gibbs Sampler to Learn the Regulation Programs in a Transcription Regulatory Module Network*, IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology, 2010, pages 1–8.
- C-67.** **Christine Kehyayan** and Gregory Butler, *Issues with the PipeAlign Phylogenomics Toolkit in Identifying Protein Subfamilies*, IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology, 2010.



- C-66. Bahman Zamani** and Greg Butler, *Describing Pattern Languages for Checking Design Models*, Proceedings of the 16th Asia-Pacific Software Engineering Conference, APSEC 2009, pages 197–204
- C-65. Stephen Barrett**, Daniel Sinnig, Patrice Chalin, Greg Butler, *Merging of Use Case Models: Semantic Foundations*, 3rd IEEE International Symposium on Theoretical Aspects of Software Engineering, July 29–31, 2009, Tianjin, China.
- C-64.** Xiang Jia Min, Gregory Butler, Reginald Storms, and Adrian Tsang, *Comparative Assessment of DNA Assemblers for Assembling Expressed Sequence Tags*, 4th Ohio Collaborative Conference on Bioinformatics, Case Western Reserve University, Cleveland, Ohio June 15–17, 2009.
- C-63. Bahman Zamani, Sahar Kayhani**, Greg Butler, *A Pattern Language Verifier for Web-Based Enterprise Applications*. Model Driven Engineering Languages and Systems, Lecture Notes in Computer Science **5301**, 553–567, 2008.
- C-62. Stephen Barrett**, Patrice Chalin, Greg Butler, *Model Merging Falls Short of Software Engineering Needs*, 2nd Workshop on Model-Driven Software Evolution, 12th European Conference on Software Maintenance and Reengineering, Athens, Greece, April 1, 2008.
- C-61. Michel Nathan** and Greg Butler, *A Refined Multisite Fungal Protein Localizer*, Artificial Intelligence and Applications, Innsbruck, Austria, February 11–13, 2008.
- C-60. Bahman Zamani** and Greg Butler, *Critiquing the Application of Pattern Languages on UML Models*, Proceedings of 2nd Workshop on Quality in Modeling, Ludwik Kuzniarz, Jean Louis Sourrouille, Miroslaw Staron (editors). Nashville, TN, USA, October 2, 2007. pp. 18–35. ISBN-978-91-7295-984-2
- C-59. Michel Nathan** and Greg Butler, *An Experiment on Using Temporal Ontologies to Reason about Localization and Transport of Fungal Proteins*, Health Care and Life Sciences Data Integration for the Semantic Web, Workshop on Health Care and Life Sciences Data Integration for the Semantic Web, 16th International World Wide Web Conference, Banff, Canada, May 8, 2007.
- C-58. Alireza Shaneh** and Greg Butler, *Bayesian Learning for Feed-Forward Neural Network with Application to Proteomic Data: The Glycosylation Sites Detection of the Epidermal Growth Factor-Like Proteins Associated with Cancer as a Case Study*, L. Lamontagne and M. Marchand (Eds.): Canadian AI 2006, Lecture Notes in Artificial Intelligence, Vol. **4013**, 2006, pp. 110–121.
- C-57.** *Christopher J.O Baker*, **Xiao Su**, Volker Haarslev, Greg Butler. *Ontoligent Interactive Query Tool*, Canadian Semantic Web Working Symposium 2006, 6 June 2006, Quebec, Canada.
- C-56. Farzad Kohantorabi**, Greg Butler. *A distributed agent system upon web technologies to provide biological data*, Canadian Semantic Web Working Symposium 2006, 6 June 2006, Quebec, Canada.
- C-55. Lugang Xu** and Greg Butler, *Cascaded refactoring for framework development and evolution*, Australian Software Engineering Conference, IEEE Computer Society, 2006, 319–330
- C-54.** Greg Butler, **Guang Wang, Yue Wang, Liqian Zou**, *Query Optimization for a Graph Database with Visual Queries*, Database Systems for Advanced Applications 2006, Springer, 2006, pp. 602–616.

- C-53. Arash Shaban-Nejad**, *Christopher Baker*, Volker Haarslev, Greg Butler. *The FungalWeb Ontology: Semantic Web Challenges in Bioinformatics and Genomics*. International Semantic Web Conference 2005: 1063–1066.
- C-52.** Greg Butler, **Guang Wang**, **Yue Wang**, **Liqian Zou**, *A graph database with visual queries for genomics*, Proceedings of Third Asia-Pacific Bioinformatics Conference, Imperial College Press, 2005, pp. 31–40.
- C-51. Ibrahim Haddad** and Greg Butler, *Experimental Studies of Scalability in Clustered Web Systems*, 18th International Parallel and Distributed Processing Symposium, IEEE Computer Society 2004, page 185, ISBN 0-7695-2132-0
- C-50. Jian Xu**, **Wei Yu**, **Kexing Rui**, Greg Butler, *Use Case Refactoring: A Tool and a Case Study*, Proceedings of the 11th Asia-Pacific Software Engineering Conference, IEEE Computer Society, 2004, pp. 484–491.
- C-49. Wei Yu**, **Jun Li**, Greg Butler, *Refactoring use case models on episodes*, Proceedings of the 19th International Conference on Automated Software Engineering, IEEE Computer Society, 2004, pp. 328–331.
- C-48. Jingxue Zhou**, **Bin Nie**, Greg Butler, *An efficient B+-tree implementation in C++ using the STL style*, 6th International Conference on Enterprise Information Systems, Volume 1: Databases and Information Systems Integration, 2004, pages 163–168.
- C-47. Vivien Liang**, Greg Butler, *WISH query composer*, 6th International Conference on Enterprise Information Systems, Volume 1: Databases and Information Systems Integration, 2004, pages 566–569.
- C-46.** Shengbing Ren, Greg Butler, **Kexing Rui**, **Jian Xu**, **Wei Yu**, **Ren Hong Luo**, *A Prototype Tool for Use Case Refactoring*, 6th International Conference on Enterprise Information Systems, Volume 3: Information Systems Analysis and Specification, 2004, pages 173–178.
- C-45. Yun Mai**, **Jinmiao Li**, Greg Butler, *Difficult issues in designing Adaptive Object Model systems*, 6th International Conference on Enterprise Information Systems, Volume 3: Information Systems Analysis and Specification, 2004, pages 295–302.
- C-44. Jinmiao Li**, **Yun Mai**, Greg Butler, *Implementing exception handling policies for workflow management systems*, Proceedings of Asia-Pacific Software Engineering Conference, IEEE Computer Society Press, Los Alamitos, CA, 2003, pp. 564–573.
- C-43. Ju Wang**, **Jinmiao Li**, Greg Butler, *Implementing the PostgreSQL query optimizer within the OPT++ framework*, Proceedings of Asia-Pacific Software Engineering Conference, IEEE Computer Society Press, Los Alamitos, CA, 2003, pp. 262–272.
- C-42.** Greg Butler, **Yueqin Chen**, **Yimin Liu**, **Yan Meng**, *Guidelines for data modeling in bioinformatics*, Proceedings 7th Joint Conference on Information Sciences, Atlantic Symposium on Computational Biology and Genome Informatics, 2003, (Carey NC, September 26-30, 2003), Ken Chen, Shu-Heng Chen, Heng-Do Cheng, David K.Y. Chiu, Sanjay Das, Richard Duro, Zhen Jiang, Nik Kasabov, Etienne Kerre, Hong Va Leong, Qing Li, Mi Lu, Manual Grana Romay, Dan Ventura, Paul P. Wang, Jie Wu (editors), Association for Intelligent Machinery, Durham, NC, 2003, pp. 907–910.

- C-41.** Shengbing Ren, **Kexing Rui**, Greg Butler, *Refactoring scenario specifications: A Message Sequence Chart approach*, Object-Oriented Information Systems, Lecture Notes in Computer Science, **2817**, Springer-Verlag, Berlin, 2003, pp. 294–298.
- C-40.** **Kexing Rui**, Shengbing Ren, Greg Butler, *Refactoring Use Case Models: A Case Study*, 5th International Conference on Enterprise Information Systems, Volume 3: Information Systems Analysis and Specification, 2003, pp. 239–244.
- C-39.** Greg Butler, **Xin Shen**, **Lugang Xu**, *Issues in architectural modeling and evolution in the Know-It-All case study*, Workshop on Model-Based Development: Features, Components and Architectures, at 10th IEEE Symposium and Workshops on Engineering of Computer-Based Systems, Huntsville, Alabama, April 7-11, 2003, pp. 321–330.
- C-38.** **Kexing Rui** and Greg Butler, *Refactoring Use Case Models: The Metamodel*, Twenty-Fifth Australasian Computer Science Conference, Adelaide, Australia. Conferences in Research and Practice in Information Technology, Vol. **16**. Michael Oudshoorn, Ed. February 4–7, 2003, pp. 301–308.
- C-37.** Greg Butler, *Architectural refactoring in framework evolution: A case study*, Generative Programming and Component Engineering, Don Batory, Charles Consel, Walid Taha (eds), Lecture Notes in Computer Science **2487**, Springer, New York, 2002, pp 128–139.
- C-36.** Greg Butler, **Lugang Xu**, *Cascaded Refactoring for Framework Evolution*, Proceedings of 2001 Symposium on Software Reusability, (May 10-11, 2001, Toronto), ACM Press, 2001, pp. 51–57.
- C-35.** **Shawn Delaney**, Greg Butler, Clement Lam, Larry Thiel, *Three Improvements to the BLASTP Search of Genome Databases*, Proceedings of the 12th International Conference on Scientific and Statistical Database Management, Oliver Günther and Hans-J. Lenz (eds), IEEE Computer Society, Los Alamitos, CA, 2000, pp. 14–24.
- C-34.** Greg Butler, Erich Bornberg-Bauer, Gosta Grahne, Franz Kurfess, Clement Lam, Joey Paquet, Isabel Rojas, Rajjan Shinghal, Lixin Tao, Adrian Tsang. *The BioIT Projects: Internet, Database and Software Technology Applied to Bioinformatics*, International conference on advances in infrastructure for electronic business, science and education on the internet, July 31 – August 5, 2000, Coppoto, Italy. ISBN 88-85280-52-8
- C-33.** Greg Butler, **Andrea Gantchev**, Peter Grogono, *Reusable strategies for software agents via the subsumption architecture*, Proceedings of Asia-Pacific Software Engineering Conference, IEEE Computer Society Press, Los Alamitos, CA, 1999, pp. 326–333.
- C-32.** **M.M. Abdalla**, F. Khendek, G. Butler, *New results on deriving SDL specifications from MSCs*, Proceedings of the SDL Forum '99, R. Dssouli, G.v. Bochmann and Y. Lahav (eds.), Elsevier Science B. V., 1999, pp. 51–66.
- C-31.** G. Butler, **T. Kharma**, *I.A. Tjandra, Towards OM — An object-oriented implementation of Mantra*. Database Systems 99, John Roddick (editor), Australian Computer Science Communications vol. **21**, no. 2, pp. 89–100, Springer-Verlag, Singapore, 1999.
- C-30.** **S. Li** and G. Butler, *Reengineering a B-tree implementation using design patterns*, Computer Science 99, Jenny Edwards (editor), Australian Computer Science Communications vol. **21**, no. 1, pp. 384–395, Springer-Verlag, Singapore, 1999.

- C-29.** G. Butler, P. Grogono and F. Khendek, *A reuse case perspective on documenting frameworks*, Proceedings of Asia-Pacific Software Engineering Conference IEEE Computer Society Press, Los Alamitos, CA, 1998, pp. 94–101.
- C-28.** Y. Peng, F. Khendek, P. Grogono, G. Butler, *Feature interactions detection technique based on feature assumptions*, Feature Interactions in Telecommunications and Software Systems, K. Kimbler and L.G. Bouma (eds), IOS Press, Amsterdam, 1998, pp. 291–298.
- C-27.** F. Khendek, G. Robert, G. Butler, P. Grogono, *Implementability of Message Sequence Charts*, in International Workshop of SDL Forum Society on SDL and MSCs, 1998, pages 71–80.
- C-26.** G. Butler, P.D. Grogono and F. Khendek, *A Z specification of use cases: A preliminary report*, Proceedings of Asia-Pacific Software Engineering Conference and International Computer Science Conference, IEEE Computer Society Press, Los Alamitos, CA, 1997, pages 505–506.
- C-25.** G. Butler, *Quality and reuse in industrial software engineering*, Proceedings of Asia-Pacific Software Engineering Conference and International Computer Science Conference, IEEE Computer Society Press, Los Alamitos, CA, 1997, pages 3–12.
- C-24.** G. Butler, *Software architecture for computer algebra: A case study*, Design and Implementation of Symbolic Computation Systems, J. Calmet and C. Limongelli (eds), Lecture Notes in Computer Science **1128**, Springer-Verlag, Berlin, 1996, pages 277–286.
- C-23.** G. Butler, P. Grogono, R. Shinghal, I.A. Tjandra, *Document recognition, semantics, and symbolic reasoning in reverse engineering of software*, Artificial Intelligence and Symbolic Mathematical Computing, J. Calmet, J.A. Campbell and J. Pfalzgraf (eds), Lecture Notes in Computer Science **1138**, Springer-Verlag, Berlin, 1996, pages 38–48.
- C-22.** G. Butler, P. Grogono, R. Shinghal, I.A. Tjandra, *Analyzing the logical structure of data flow diagrams in software documents*, Proceedings of the Third International Conference on Document Analysis and Understanding, 1995, IEEE Press, pp. 575–578.
- C-21.** G. Butler, P. Grogono, R. Shinghal, I.A. Tjandra, *Retrieving information from data flow diagrams*, Proceedings of Second Working Conference on Reverse Engineering, L. Wills, P. Newcomb, E. Chikofsky (eds), IEEE Computer Society Press, Los Alamitos, CA, 1995, pages 22–29.
- C-20.** I.A. Tjandra and G. Butler, *Formal representation of reusable software modules*, Proceedings of Second Working Conference on Reverse Engineering, L. Wills, P. Newcomb, E. Chikofsky (eds), IEEE Computer Society Press, Los Alamitos, CA, 1995, pages 198–205.
- C-19.** G. Butler, *Intelligent mathematical databases*, Database Systems for Advanced Applications '95, T.W. Ling and Y. Masunaga (eds), World Scientific Press, Singapore, 1995, pp.326–332.
- C-18.** Greg Butler and Clement Lam, *The preliminary design of an object-oriented framework for combinatorial enumeration*, Object-Oriented Technology for Database and Software Systems, V.S. Alagar and R. Missaoui (eds), World Scientific Publishing, 1995, pp. 134–144.
- C-17.** G. Butler, *Datalog and TwoGroups and C++*, Integrating Symbolic Mathematical Computation and Artificial Intelligence, Jacques Calmet and John A. Campbell (eds), Lecture Notes in Computer Science **958**, Springer-Verlag, Berlin, 1995, pp. 80–92.
- C-16.** G. Butler, *Computing the conjugacy classes of elements of a finite group*, Groups'93 Galway/St Andrews. C.M. Campbell, T.C. Hurley, E.F. Robertson, S.J. Tobin, J.J. Ward (eds), CUP, Cambridge, 1995, 80–112.

- C-15.** F. Ng and G. Butler, *Specialized theorem-proving in an intelligent tutoring system for the Dijkstra-Gries programming methodology*, Proceedings ICCI'93, (Fifth International Conference, Computing and Information, May 27–29, 1993, Sudbury, Ontario Canada), Osman Abou-Rabia, Carl K. Chang, Waldemar W. Koczkodaj (editors), IEEE Computer Society Press, Los Alamitos, CA, 1993, pp. 294–298.
- C-14.** G. Butler, *The progress towards an intelligent assistant — a discussion paper*, Artificial Intelligence and Symbolic Mathematical Computing, Jacques Calmet and John A. Campbell (eds), Lecture Notes in Computer Science **737**, Springer-Verlag, Berlin, 1993, pp. 107–115.
- C-13.** G. Butler, *Experimental comparison of algorithms for Sylow subgroups*, ISSAC 92, Paul S. Wang (ed.), ACM Press, New York, 1992, pp.251–262.
- C-12.** G. Butler, *Implementing some algorithms of Kantor*, AAEECC-9, H.F. Mattson, T. Mora, T.R.N. Rao (eds), Springer LNCS **539**, 1991, pp. 82–93.
- C-11.** G. Butler, S.S. Iyer, and S.H. Ley, *A deductive database for the groups of order dividing 128*, ISSAC 91, S.M. Watt (ed.), ACM Press, New York, 1991, pp. 210–218.
- C-10.** G. Butler and J.J. Cannon, *The design of Cayley — a language for modern algebra*, in Design and Implementation of Symbolic Computation Systems, A. Miola (ed.), Springer LNCS **429**, 1990, pp. 10–19.
- C-9.** G. Butler and S.S. Iyer, *Deductive mathematical databases — a case study*, Statistical and Scientific Database Management, Z. Michalewicz (ed.), Springer LNCS **420**, 1990, pp. 50–64.
- C-8.** G. Butler and J.J. Cannon, *Cayley, version 4: the user language*, in Symbolic and Algebraic Computation, P. Gianni (ed.), Springer LNCS **358**, 1989, pp. 456–466.
- C-7.** G. Butler, *Permutation groups and p-groups*, in Computers in Algebra, M.C. Tangora (ed.), Marcel Dekker, New York, 1988, pp. 1–16.
- C-6.** G. Butler, *Divide-and-conquer in computational group theory*, SYMSAC '86, B.W. Char (ed.), ACM, New York, 1986, 59–64.
- C-5.** G. Butler, *Data structures and algorithms for cyclically extended Schreier vectors*, Congressus Numerantium **52** (May 1986) 63–78.
- C-4.** G. Butler, *On computing double coset representatives in permutation groups*, Computational Group Theory, M.D. Atkinson (ed.), Academic Press, London, 1984, 283–290.
- C-3.** G. Butler, *The maximal subgroups of the Chevalley group  $G_2(4)$* , Groups - St Andrews 1981, C.M. Campbell and E.F. Robertson (eds), CUP, Cambridge, 1982, 186–200.
- C-2.** G. Butler, *Double cosets and searching small groups*, SYMSAC '81, P. Wang (ed.), ACM, New York, 1981, 182–187.
- C-1.** G. Butler, *The Schreier algorithm for matrix groups*, SYMSAC '76, R.D. Jenks (ed.), ACM, New York, 1976, 167–170.

## Monographs

- M-5.** René Witte, Christopher JO Baker, Greg Butler, Michel Dumontier (editors), **CSWS 2013 - Proceedings of the 4th Canadian Semantic Web Symposium**, CEUR Workshop Proceedings, volume 1054, 2013.

**M-4.** Christopher JO Baker, Greg Butler, Igor Jurisica (editors), **Data Integration in the Life Sciences**, (Proceedings of the 9th International Conference, DILS 2013, Montreal, Canada, July 11-12, 2013), Lecture Notes in Computer Science, **7970**, Springer, 2013. Subseries: Lecture Notes in Bioinformatics

**M-3.** Greg Butler, Stan Jarzabek (editors), **Generative and Component-Based Software Engineering**, (Proceedings of a conference at Erfurt, October 9-12, 2000), Lecture Notes in Computer Science **2177**, Springer, 2001.

**M-2.** G. Butler, **Fundamental Algorithms for Permutation Groups**, Lecture Notes in Computer Science **559**, Springer-Verlag, Heidelberg, 1991, (xii)+238 pages. (research monograph)

**M-1.** G. Butler, **Computational Approaches to Certain Problems in the Theory of Finite Groups**, Ph.D. Thesis, University of Sydney, 1979, 306 pages, 2 microfiche supplements.

## Book Chapters

**BC-3.** Greg Butler, Wendy Ding, John Longo, Jack Min, *Nick O'Toole*, Sindhu Pillai, **Ronghua Shu**, **Jian Sun**, Yan Yang, Qing Xie, *Regis-Olivier Benech*, Aleks Spurmanis, Peter Ulyczynj, Justin Powlowski, Reg Storms, Adrian Tsang, *Data management for fungal genomics: An experience report*, in **Biological Database Modeling**, Jake Y. Chen and Amandeep S. Sidhu (editors), Artech House, 2008. ISBN 978-1-59693-258-6

**BC-2.** Greg Butler, **Ling Chen**, **Xuede Chen**, **Ashraf Gaffar**, **Jinmiao Li**, **Lugang Xu**, *The Know-It-All Project: A Case Study in Framework Development and Evolution*, **Domain Oriented Systems Development: Perspectives and Practices**, Kiyoshi Itoh, Satoshi Kumagai, T. Hirota (eds), Taylor and Francis Publishers, UK, 2002, pp. 101–117.

**BC-1.** G. Butler and **P. Dénomée**, *Documenting frameworks*, **Building Application Frameworks: Object-Oriented Foundations of Framework Design**, M. Fayad, D. Schmidt, R. Johnson (eds), John Wiley and Sons, New York, September 1999, pp.495–504.

## External Grants

2018–2021: TooT Suite: *Prediction and classification of membrane transport proteins*, Genome Canada 2017 Bioinformatics and Computational Biology Competition, (Butler (PI), Glatard) \$621,024. Extended to 31 December 2022.

2018–2023: *Challenges in Biomolecular Network Reconstruction*, NSERC Discovery Grant (Butler) \$140,000

2009–2013: *Genozymes for Bioproducts and Bioprocesses Development*, Genome Canada Applied Genomics Research in Bioproducts or Crops (ABC), (Tsang (PI), Butler, Dewar, Sylvestre, LaBoissière, Secko, Powlowski, Savchenko, Kumar, Sensen, McAllister, Jiang) \$17,422,931. Butler: \$3,618,102 Extended to 30 September 2014.

2009–2014: *Knowledge-Based Bioinformatics*, NSERC Discovery Grant (Butler) \$120,000

2008–2011: *Cellulosic Biofuel Network (CBioN)*, Agriculture and AgriFood Canada (AAFC) Agricultural Bioproducts Innovation Program (ABIP) (S. Laberge (AAFC) (PI), M. Gruber (AAFC) (co-PI), and 40 others) \$19,800,000. Butler: \$1,105,868

- 2006–2009: *Development of enzymatic pulp and paper applications*, NSERC Strategic Grant (Tsang, Butler) \$561,514. Butler: \$200,000
- 2004–2009: *Knowledge-Based Bioinformatics*, NSERC Discovery Grant (Butler) \$148,500
- 2003–2006: *Ontologies, the semantic web, and intelligent systems for genomics*, Genome Quebec Bioinformatics Project (Haarslev and 9 others) \$590,000. Butler: \$60,000
- 2003–2005: *High throughput gene expression*, Genome Quebec Bioinformatics Project (Robert Nadon (McGill) and 10 others) \$470,000. Butler: \$1,500
- 2003–2006: *Comparative and integrative genomics*, Genome Quebec Bioinformatics Project (Hervé Philippe (Montreal) and 40 others) \$470,000. Butler: \$1,500
- 2003–2005: *Identification, profiling, and functional assignment of the expressed genome*, Genome Quebec Bioinformatics Project (Abou Elela (Sherbrooke) and 11 others) \$600,000. Butler: \$100
- 2002–2005: *Genomic approach to identify fungal enzymes for industrial processes*, Genome Canada Large Project Grant (Tsang and 11 others) \$6,900,000. Butler: \$650,000
- 2001–2004: *Gene discovery and expression analysis in *Aspergillus niger**, NSERC Genomics Project Grant (Storms, Tsang, Butler) \$570,000. Butler: \$57,000
- 2000–2004: *Frameworks and databases with applications to bioinformatics*, NSERC Individual Operating Grant (Butler) \$113,192
- 1999–2003: *Biotechnology and bioinformatics facility*, CFI Institutional Innovation Fund (Tsang and 5 others) \$1,246,080
- 1999–2003: *Biotechnology and bioinformatics facility*, MEQ Institutional Innovation Fund (Tsang and 5 others) \$1,246,080
- 1999: *Centre Interuniversitaire en Calcul Mathématique Algébrique*, FCAR Centre Grant (Darmon (McGill) et al) \$50,000. Butler: \$2,500
- 1996–2000: *Software architectures, algorithms and databases for computer algebra*, NSERC Individual Operating Grant (Butler) \$104,248
- 1996–99: *Centre Interuniversitaire en Calcul Mathématique Algébrique*, FCAR Centre Grant (Murty (McGill) et al) \$266,000. Butler: \$12,000
- 1995: *Upgrade for CICMA computing laboratory*, NSERC Equipment Grant (Lam, Butler) \$60,000
- 1994–97: *Development of computational techniques in combinatorics, algebra and number theory*, FCAR Team Grant (Lam et al) \$136,800 Butler: \$15,000
- 1994: *Upgrade for CICMA computing laboratory*, NSERC Equipment Grant (Cummins et al) \$30,926
- 1993–96: *Centre Interuniversitaire en Calcul Mathématique Algébrique*, FCAR Centre Grant (Kisilevsky et al) \$210,000 Butler: \$5,000
- 1993–96: *Concordia University mathematical computing laboratory*, NSERC Infrastructure Grant (Lam et al) \$51,000 Butler: \$5,000
- 1993–96: *Algorithms, reusable software, and databases for computer algebra*, NSERC Individual Operating Grant \$66,000

1992: *Workstation*, NSERC Equipment Grant (Butler) \$17,350

1986–91: *Language and knowledge based systems for modern algebra*, Australian Research Council (ARC) Project Grant (Cannon, Butler), \$156,355

1982–91: *Algebraic algorithms and their applications*, ARC Project Grant (Wall, Cannon, Butler), \$232,833

## Internal Grants

2018: *F.A.I.R. Guidelines for Machine Learning and Knowledge Discovery: How to do reproducible science in A.I.*, Concordia University Vice-President, Research and Graduate Studies, Aid to Research Related Events, Exhibition, Publication and Dissemination Activities (Butler, Glatard), \$7,500

2015–2017: *Computational Infrastructure for Natural Language Processing, Knowledge Discovery, and Data Mining for Bio-processing in Pulp and Paper and Forestry*, ENCS Capital Research Innovation Fund, (Kosseim (PI), Bergler, Butler, Haarslev, Shiri), \$141,891

2014: Bridging Grant, Concordia University Vice-President, Research and Graduate Studies (Butler), \$15,500

2013: *Canadian Semantic Web Symposium 2013*, Concordia University Vice-President, Research and Graduate Studies, Aid to Research Related Events, Exhibition, Publication and Dissemination Activities (Butler), \$7,500

1997–99: *Bioinformatics infrastructure for genomics-based research*, Concordia University Faculty Research Development Program (FRDP) Major Interdisciplinary Research Initiatives (MIDRI) (Tsang and 5 others) \$90,000 Butler: \$15,000

1996–98: *Development of reliable and robust software*, Concordia University Seagram Innovative Research (Grogono, Butler) \$30,000 Butler: \$15,000

1992–95: *Reusable reliable software components for computer algebra*, Concordia University Faculty Research Development Program (FRDP) Start-up Operating Grant (Butler), \$52,000

1992: Concordia University FRDP Equipment Grant (Butler), \$5,000

1990: *Sun computer system for Computer Algebra group*, University of Sydney Large Items of Equipment Grant (Cannon, Butler), \$46,000

1988: *Fileserver for research workstations*, University of Sydney Large Items of Equipment Grant (Quinlan, Foo, Butler, Kay, Catlett), \$112,000

1987: *Sun computer system for Computer Algebra group*, University of Sydney Large Items of Equipment Grant (Cannon, Butler), \$58,000



## Training of Highly Qualified Personnel

Type	Current	Completed
Professional Staff	1	34
Post-doctoral fellow	0	6
PhD thesis	2	16
Master's thesis	1	50
Master's major project	0	16
Undergraduate project	0	20

Table 1: Number of Theses and Projects

### Post-Doctoral Fellows

Marie-Jean Meurs (2010–2015) PhD, University of Avignon, France, on Natural Language Processing, Semantic Web, Data Mining and Bioinformatics, for Genome Canada ABC project. Co-supervised with R. Witte (2010–2012).

Vo Cam Quy (2013–2014) PhD, RWTH Aachen University, 2013. Protein design of active sites, for Genome Canada ABC project. Co-supervised with A. Tsang and J.P. Powlowski.

Thomas Triplet (2009–2013). PhD Computer Science, University of Nebraska, Lincoln, 2009. Bioinformatics databases and machine learning. Genome Canada ABC project.

Nicholas J. O'Toole (2004–2005), co-supervised with A. Tsang. PhD in Physics, University of Western Australia, 2000. Bioinformatics. Genome Canada competition II project.

Yi Tao (2002–2003), PDF/Biostatistician, Genome Canada competition II project.

Indira Adiono Tjandra (1993–1995), co-supervised with P.D. Grogono and R. Shinghal. PhD, Computer Science, Universität Karlsruhe, 1993. Analysis of data-flow diagrams.

### Ph D Students

Sima Ataei (2019–now), current. Bioinformatics.

Hamed Ghazikhani (2019–now), current. Bioinformatics.

Stuart Thiel (2021), **The Diverting Fast Radix Algorithm**, Department of Computer Science and Software Engineering, Concordia University. Present Position: Part-Time Instructor, Montreal.

Stephanie Kampgnia Wonkap (2020), **Gene Regulatory Network Inference Using Machine Learning Techniques**, Department of Computer Science and Software Engineering, Concordia University. Present Position: Artificial Intelligence Consultant, Slalom, Montreal.

Munira Alballa (2020), **Predicting transporter proteins and their substrate specificity**, Department of Computer Science and Software Engineering, Concordia University. Present Position: Lecturer, Saudi Arabia.

Kasra Zandi (2018), **Computational Design and Experimental Validation of Functional Ribonucleic Acid Nanostructures**. Department of Computer Science and Software Engineering, Concordia University. (joint supervision with Nawwaf Kharmah, Department of Electrical and Computer Engineering) Present Position: Artificial Intelligence Engineer, Intact, Montreal.

Faizah Aplop (2016), **Computational Approaches for Improving the Reconstruction of Metabolic Pathways**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Lecturer, Informatics, Universiti Malaysia Terengganu.

Christine Houry Kehyayan (2013), **Using Synteny in Phylogenomics Algorithms to Cluster Proteins**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Software developer, Microsoft, Seattle.

Jianlong Qi (2011), **Inferring Regulation Programs in a Transcription Regulatory Module Network**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Bioinformatician, CA, USA.

Stephen C. Barrett (2011), **Blending State Differences and Change Operations for Meta-model Independent Merging of Software Models**. (joint supervision with Patrice Chalin) Department of Computer Science and Software Engineering, Concordia University. Present Position: Post-doctoral fellow, Kansas State University.

Yue Wang (2010), **On Visual Queries and Graph Databases with Application to Genomics**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Software developer, Montreal.

Bahman Zamani (2009), **On Verifying the Use of a Pattern Language in Model Driven Design**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Associate Professor, Department of Software Engineering, University of Isfahan, Iran.

Kexing Rui (2007), **Refactoring Use Case Models**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Software developer, Toronto.

Ibrahim Haddad (2006), **The HAS Architecture: A Highly Available and Scalable Cluster Architecture for Web Servers**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Head of Open Source Innovation Group at Samsung Research America.

Lugang Xu (2005), **Cascaded Refactoring for Framework Development and Evolution**. Department of Computer Science and Software Engineering, Concordia University. Present Position: Software Architect, BMO, Montreal.

Sridhar Sankarnarayan Iyer (1992), **On Databases and Knowledge-bases for Modern Algebra**. Basser Department of Computer Science, University of Sydney. Present Position: Independent consultant, New Jersey, USA.

Frank C.N. Ng (1990), **Ego: An Expandable Goal-Oriented Tutoring System**. (joint supervision with J. Kay and R.J. Kummerfeld) Basser Department of Computer Science, University of Sydney. Present Position: Senior Software Architect, IBM, Sydney.

Janet Wiles (1987), **Studies of Problems related to Parallel Distributed Associative Models of Memory**. (joint supervision with J.R. Seberry and L.M. Goldschlager) Basser Department of Computer Science, University of Sydney. Present Position: Professor, Departments of Computer Science and Psychology, University of Queensland, St Lucia, Queensland.

## Professional Staff

Stuart Thiel (2018–2020; 2021–2022). Software developer.

Andrei Wasylyk (2015–2019). System administrator.

Alexander Beaudoin (2011–2019). Programmer.

Vahé Chahinian (2012–2015). Programmer.

Andrei Wasylyk (2011–2014). System administrator.

Paul Peirara-Brunner (2011–2012) System administrator.

David Mason (2009–2014). Programmer/system administrator.

Yulan Jin (2011–2012). Biostatistician.

Carol Nyaga (2013–2015), co-supervised with A. Tsang. Curator.

Thi Truc Minh Nguyen (2013–2019), co-supervised with A. Tsang. Curator.

Erin McDonnell (2012–2019), co-supervised with A. Tsang. Curator.

Caitlin Murphy (2011–2013), co-supervised with A. Tsang. Curator.

Emmet O’Brien (2010–2015), co-supervised with A. Tsang. Bioinformatician.

Wendy Findlay (2009–2014), co-supervised with A. Tsang. Bioinformatician.

Nick O’Toole (2009–2015), co-supervised with A. Tsang. Bioinformatician.

Ian Reid (2009–2019), co-supervised with A. Tsang. Bioinformatician.

Min Wu (2008–2015). Database administrator.

Marek Krajewski (2008–2011). Programmer.

David Reisch (2010–2010). Programmer.

Adam Cimino (2008–2010). Programmer.

Brendan Asseltine (2008–2009). Programmer.

Tatiana Iouk (2009–2010), co-supervised with A. Tsang. Research Associate.

Christopher Baker (2003–2006), co-supervised with V. Haarslev. Bioinformatics Project Manager.

Jian Sun (2001–2005). Programmer.

Xiang Jia (Jack) Min (2002–2005), co-supervised with A. Tsang. Bioinformatician.

Yan Yang (2004–2005). Database Administrator.

John Longo (2004–2005). System Administrator.

Brigitte Malette (2003–2005), co-supervised with A. Tsang. Biostatistician.

Wendy Ding (2003–2005). Programmer.

Sindhu Pillai (2002–2004). Database administrator.

Qing Xie (2004–2004). Programmer/Database administrator.

Krastyo Komsalov (2002–2004). System Administrator.

Chris Beck (2003–2004). Programmer.

Yi Tao (2002–2003), co-supervised with A. Tsang. Biostatistician.

Chellappa Gopalakrishnan (2002–2003). Bioinformatician.

Bruno Asselin (2003–2003). Programmer.

## Master's Research Students

Steve Morse (2020–now), current. Bioinformatics.

Shiva Shamloo (2021), **TportHMM: Predicting the Substrate Class of Transmembrane Transport Proteins Using Profile Hidden Markov Models and Multiple Sequence Alignment**, Department of Computer Science and Software Engineering, Concordia University.

Akhil Jobby (2019), **Multiple Sequence Alignment of Beta Barrel Transmembrane Proteins**, Department of Computer Science and Software Engineering, Concordia University.

Qing Ye (2019), **Classifying Transport Proteins Using Profile Hidden Markov Models and Specificity Determining Sites**, Department of Computer Science and Software Engineering, Concordia University.

Lin Cheng (2014), **Implementing and Accelerating HMMER3 Protein Sequence Search on CUDA-Enabled GPU**. Department of Computer Science and Software Engineering, Concordia University.

Jun Luo (2012), **ECTree: An Extended Tree Index Structure for Attributed Subgraph Queries**. Department of Computer Science and Software Engineering, Concordia University.

Hajar Sadrarhami (2010), **Integration of and Access to Distributed Data and Tools in Genomics**, Department of Computer Science and Software Engineering, Concordia University.

Lee Zamparo (2010), **Two Methods to estimate Protein Copy Number from Drosophila Embryo Image Data**, Department of Computer Science and Software Engineering, Concordia University.

Farzad Kohantorabi (2006), **An Agent System upon Semantic Web Technologies to Provide a Fungal Genomics Data Warehouse**, Department of Computer Science and Software Engineering, Concordia University.

Michel Nathan (2006), **A Multiple Site Predictor for Subcellular Localization of Fungal Proteins**. Department of Computer Science and Software Engineering, Concordia University.

Alireza Darissi Shaneh (2006), **In Silico Detection and Prediction of Glycosylation Sites in the Epidermal Growth Factor-like Proteins using Feed-forward Neural Networks**, Department of Computer Science and Software Engineering, Concordia University.

Ashwin Bhat Gulpur (2005), **The Development of a Tool for Mapping Protein Mutations to Sequence Structures**, Department of Computer Science and Software Engineering, Concordia University.

Jian Sun (2004), **The Design and Implementation of an EST Annotation Database for Fungal Genomics Project**, Department of Computer Science and Software Engineering, Concordia University.

Yi Chen (2004), **A Prototype Workflow Engine Partially Supporting YAWL (Yet Another Workflow Language)**, Department of Computer Science and Software Engineering, Concordia University.

Xuede Chen (2004), **Implementing Visual Queries and Presentations with Blobs**, Department of Computer Science and Software Engineering, Concordia University.

Qiu Wen Li (2004), **Reengineering an object-oriented framework for extensible query optimization**, Department of Computer Science, Concordia University.

Yan Yang (2004), **Data Storage for Cluster Analysis of Microarray Gene Expression Data**, Department of Computer Science, Concordia University.

Wei Yu (2004), **Refactoring of use case models based on episodes**, Department of Computer Science, Concordia University.

Jian Xu (2004), **On refactoring of use case models**, Department of Computer Science, Concordia University.

Ming An Zhong (2004), **An R-Tree Index using the STL style**, Department of Computer Science, Concordia University.

Guang Wang (2004), **Linking Coral to MySQL and PostgreSQL**, Department of Computer Science, Concordia University.

Longchang Fu (2003), **Validation and Implementation of an Enzyme Activity Mapping Database**, Department of Computer Science, Concordia University.

Bin Nie (2003), **A Tree Index Framework for Databases**, Department of Computer Science, Concordia University.

Wei Hua Liang (2003), **WiSH Query Composer**, Department of Computer Science, Concordia University.

Yimin Liu (2003), **Data Modeling for Biochemical Pathways and Microarray Gene Expression**, Department of Computer Science, Concordia University.

Jin Geng (2003), **A Framework-Based Object-Oriented Design of Blast**, Department of Computer Science, Concordia University.

Talal Al-Khoury (2003), **A Physical Store for a Relational Database in the STL Style**, Department of Computer Science, Concordia University.

Jingxue Zhou (2003), **A B+-Tree Index for the Know-It-All Database Framework**, Department of Computer Science, Concordia University.

Yueqin Chen (2003), **Pipeline for the Quality Control of Sequencing**, Department of Computer Science, Concordia University.

Liqian Zou (2003), **GraphLog: Its representation in XML and translation to Coral**, Department of Computer Science, Concordia University.

Ronghua Shu (2003), **Design of an enzyme activity mapping database**, Department of Computer Science, Concordia University.

Yang Li (2003), **Workflow management system for Jini-based Blast cluster server**, Department of Computer Science, Concordia University.

Yan Meng (2003), **Data modeling for sequence quality control and assembly of a cDNA library**, Department of Computer Science, Concordia University.

Elizabeth Martinez Aguilar (2003), **Electronic distribution of searchable technical documentation libraries**, Department of Computer Science, Concordia University.

Ju Wang (2002), **Implementing the PostgreSQL Optimizer within the OPT++ Framework**, Department of Computer Science, Concordia University.

Liusong Yang (2002), **A Design of a BLAST Server with Jini Technology**, Department of Computer Science, Concordia University.

Xin Shen (2002), **An Architecture Tradeoff Analysis of PostgreSQL**, Department of Computer Science, Concordia University.

Andrea Gantchev (2001), **Object-Oriented Design of a Subsumption Architecture**, Department of Computer Science, Concordia University.

Ashraf Gaffar (2001), **Design of a Framework for Database Indexes**, Department of Computer Science, Concordia University.

Jinmiao Li (2001), **An Object-Oriented Framework for Extensible Query Optimization**, Department of Computer Science, Concordia University.

Roger Bernier (2000), **Design of a Zooming Viewer for Statecharts**, Department of Computer Science, Concordia University.

Shawn Delaney (1998), **Reverse Engineering and Optimization of the BLASTP Program**. Department of Computer Science, Concordia University.

Steven Li (1998), **Re-engineering a B-Tree Implementation using Design Patterns**. Department of Computer Science, Concordia University.

Pierre Dénomée (1998), **A Case Study in Documenting and Developing Frameworks**. Department of Computer Science, Concordia University.

Iustin Lazar (1998), **A Multi-level Nearest Neighbour Algorithm for Predicting Protein Secondary Structure**. Department of Computer Science, Concordia University.

Tania Kharm (1996), **Reengineering Unification and T-Entailment for Mantra in C++**. Department of Computer Science, Concordia University.

Dorel Baluta (1995), **A Formal Specification in Z of the Relational Data Model, Version 2, of E. F. Codd**. Department of Computer Science, Concordia University.

John Bignucolo (1991), **PolyAct — A Polymorphic Actor Language**. Basser Department of Computer Science, University of Sydney.

Stephen C. Hirst (1986), **Symbolic Regular Algebra**. Basser Department of Computer Science, University of Sydney.

## Master's Reports

- Xiao Yang (2004), **Generic C++ Implementation of Pairwise Sequence Alignment: Instantiation for Local Alignment**, Department of Computer Science, Concordia University.
- Fang Lin (2004), **A Design Document for the CORAL Deductive Database System**, Department of Computer Science, Concordia University.
- Yan Zhang (2003), **Generic C++ Implementation of Pairwise Sequence Alignment: Instantiation for Global Alignment**, Department of Computer Science, Concordia University.
- Jang Hwan Kwon (2003), **A feature model of the Oracle 9i database server**, Department of Computer Science, Concordia University.
- Radu Deca (2002), **Meta-CLI Configuration Data Model for Network Device Management**, Department of Computer Science, Concordia University. Co-supervised with Omar Cherkaoui, UQAM.
- Ling Chen (2001), **User Interface Design for a Diagrammatic Query Tool**, Department of Computer Science, Concordia University.
- Liang Yu (2001), **Truckin' Simulation and Visual Interface**, Department of Computer Science, Concordia University.
- Wael Hassan (2000), **Web Support for Automated Analysis of DNA Sequences**, Department of Computer Science, Concordia University.
- Xioaming Tang (1999), **A Software Tool to Display Message Sequence Charts**. Department of Computer Science, Concordia University.
- Georges Ayoub (1998), **Object-Oriented Database Management System Case Study for Declarative Query Language**. Department of Computer Science, Concordia University.
- Adrian Cretu (1997), **Use Case Software Development and Testing Using Operational Profiles**. Department of Electrical and Computer Engineering, Concordia University.
- Minh Hang Pham (1997), **An Interpreter for Object Comprehension Query Language**. Department of Computer Science, Concordia University.
- Mohan Rao Tadisetty (1997), **On the Design and Implementation of a Top-Down Datalog Interpreter in C++**. Department of Computer Science, Concordia University.
- Alexander Lakher (1997), **Object Comprehension Translation for Object-Oriented Databases**. Department of Computer Science, Concordia University.
- Valerie Large (1996), **The Pi-DFD Graphic Interface**. Department of Computer Science, Concordia University.
- Alison Greig (1996), **Pi-DFD Graphic Interface: DFD Graphical Analysis within ET++ Framework using CWB Tool**. Department of Computer Science, Concordia University.

## Undergraduate Projects

Jay Sundaram (2000), *Regulators of metabolism of starch and sugars in yeast*, NSERC Summer scholarship.

Richard Hopkirk (1995), *Design Patterns in a B-tree Implementation*, COMP490/492 project.

Giovanni Giolti (1995), *C++ Implementation of Unification*, COMP490 project (supervised with Dr Tjandra).

Byron Packwood (1995), *C++ Translator for OCL Schema Definitions*, COMP490 project.

Khanh Tuan Vu and Piotr Przybylski (1994), NSERC Summer students implementing the hB-tree, kd-tree, and MD-tree data structures for multi-dimensional retrieval in C++.

James Rothman (1994), *Using the World Wide Web to Research C++ Libraries*, COMP490 project.

Michael Sheng (1994), *A Parser in C++ for a Knowledge Representation Language, Mantra*, COMP490/492 project (supervised with Dr Tjandra).

Graham Leach (1994), *Documentation and Style for C++ Implementation of a Deductive Database*, COMP490 project.

Gilles Charles (1994), Object-oriented design and implementation of a processor for a set-theoretic query language, end report for French exchange student.

David Bauer (1993), A project on specification and C++ implementation of container classes, for COMP490/492.

Khanh Tuan Vu (1993), NSERC Summer student implementing the hB-tree data structure for multi-dimensional retrieval in C++.

Charles Brady (1989), *A C Cross Compiler for the Commodore Amiga*. Diploma project, University of Sydney.

Kannan Rathinam (1988), *Type Inference for a Polymorphic Functional Language*. Honours project, University of Sydney.

Susan Ley (1988), *A Deductive Database for 2-groups*. Honours project, University of Sydney.

John Surveyor (1988), *A B-tree Suite in C for Multi-User Databases*. Diploma project, University of Sydney.

John MacQueen (1987), *An Interpreter for a Polymorphic Functional Language*. Honours project, University of Sydney.

Adil Amin (1984), *An LL Parser Generator with Error Recovery*. Diploma project, University of Sydney.

Brad Curry (1983), *McCreight's Algorithm and Circular Strings*. Honours project, University of Sydney.

Matthew J. Kendall (1983), *Issues in Master/Slave Concurrency*. Honours project, University of Sydney.



## Teaching

Below is a list of the courses that I have taught together with the semesters or years in which I taught them. It is organized by topic area.

### Teaching – Data Science

COMP 333 (formerly COMP 499) Data Analytics: 2022/2, 2021/2, 2020/1, 2019/1, 2018/1.

### Teaching – Bioinformatics

COMP 6811 Bioinformatics Algorithms: 2022/2, 2019/2 (reading), 2009/1, 2004/4, 2003/4, 2003/1, 2001/2.

COMP 6821 Bioinformatics Databases and Systems: 2007/4, 2007/1, 2003/1, 2001/4.

COMP 791R Knowledge-Based Bioinformatics: 2005/2.

### Teaching – Software Engineering

COMP 354 Software Engineering: 2020/4, 2019/4, 2018/4, 2015/4, 2014/4, 2013/4, 2012/4, 2011/4, 2009/1, 2004/2, 2003/2, 2001/2, 1997/4, 1997/1, 1996/4, 1996/2, 1995/2, 1994/2, 1993/4, 1993/2, 1992/4.

COMP 5541 Tools and Techniques for Software Engineering: 2013/4, 2012/4, 2011/4.

COMP 6471 Software Design Methodologies: 2012/2, 2011/2, 2005/4, 2004/4, 2003/4, 2000/4, 2000/1, 1999/2, 1997/4, 1997/2, 1996/4, 1995/4, 1994/4, 1993/4.

SOEN 341 Software Process: 2008/2, 2007/2, 2006/4.

SOEN 343 Software Design: 2006/2, 2005/2.

SOEN 337 Metrics and Measurement in Software Development: 2001/4, 2000/4, 1999/4.

SOEN 6011 Software Engineering Processes: 2009/2, 2008/2, 2007/2.

SOEN 6461 Software Design Methodologies: 2017/2, 2015/2, 2014/2.

### Teaching – Programming etc

COMP 442 Compiler Design: 1997/1.

COMP 352 Data Structures: 1992/2.

COMP 245 Programming Methodology: 1995/4, 1994/4, 1993/2, 1992/2.

COMP 215 Introduction to Computer Science: 1994/2.

CS3 Logic Programming (Sydney): 1988, 1987.

CS3 Compiler Construction/Translator Writing Systems (Sydney): 1990, 1989, 1984, 1983, 1982.

CS3 Data Structures (Sydney): 1981.

CS2 Programming/Design and Data Structures (Sydney): 1989, 1988, 1987, 1986.

CS2 Formal Programming (Sydney): 1990.

CS1 Fortran (Sydney): 1983, 1981.

CS1 Programming (Sydney): 1984, 1983, 1982.

### Teaching – Other

Algorithms for Permutation Groups (Bayreuth): 1990.

Language Design and Implementation (Bayreuth): 1990.

CS Honours Symbolic and Algebraic Computation (Sydney): 1986, 1985, 1984, 1983.

CS Honours Semantics (Sydney): 1987, 1985, 1984.

CS Honours Colloquia (Sydney): 1984, 1983.

## Curriculum Development

I was a member of the committees for the establishment of the joint program between Biology and CSE on Computer Science for Health and Life Sciences, and in the revision of our joint program with Mathematics and Statistics to focus on Data Sciences.

In 2018 I proposed an undergraduate elective course in Data Analytics, which started as a slot course and in 2020 became a formal course *COMP 333 Data Analytics*.

From 2001–2005 I developed a stream of graduate bioinformatics courses: *COMP 6811 Bioinformatics Algorithms*, *COMP 6821 Bioinformatics Databases and Systems*, *COMP 791R Knowledge-Based Bioinformatics* to train students for research in bioinformatics. The courses are continually revised to remain current.

In 2001 I was a member of a multidisciplinary committee within Arts and Science that developed the curriculum for the *Graduate Diploma of Biotechnology and Genomics* and recommended its introduction to the Dean.

In 1998, together with Dr Peter Grogono (CSE), Ferhat Khendek (ECE), and Michel de Champlain (ECE), we developed the curriculum for a four-year *Bachelor of Software Engineering*. This was the first undergraduate SE program in Quebec. It was accredited.

In 1994/1995, as a member of the Curriculum Committee, I was heavily involved in a major overhaul of the undergraduate, graduate, and diploma curricula within Computer Science.

Since 1993 I focussed *COMP 6471 Software Design Methodologies* on object-oriented design with material on software architecture, frameworks, design patterns, and issue-driven design. Recently topics such as model-driven design, responsibility-driven design, and generative programming have been included.

From 1992 onwards I focussed *COMP 354 Software Engineering* lectures more in support of the students' team project, and introduced material on use cases, object-oriented development, software architectures, testing, and C++ (now Java). At the same time I have included unifying material on principles, vision and priorities, and on quality control.

In 1986 at University of Sydney as director of third-year I was a prime motivator in a protracted major review of the third-year course syllabus that recognised the importance of Communications and Networks, Cryptography, and Computer Security. In 1986–1987 I designed the *CS2 Programming* course to present the issues of programming large software systems, explain the importance of understanding the data and information involved, and emphasise the role of abstraction and information hiding in controlling complexity.

For Honours students at University of Sydney, I introduced a course on *semantics* with Norman Foo, and a series of *colloquia* covering a broad range of technical, ethical, and social aspects of computer science with Allan Bromley and Sherman Hwa.

In 1982–1983 at University of Sydney I redesigned the practical work for *CS1 programming* to emphasise stepwise refinement using a five-stage assignment for a simple relational database, and a second five-stage assignment for a simulator of a microprocessor.

## Service to University

2018–2020: Member-at-Large, Executive Committee, Concordia University Faculty Association.

2015–2016: Member, Hiring Committee, Canada Research Chair, Tier 1, Bioinformatics Algorithms.

2014–2015: Member, Hiring Committee, Canada Research Chair, Tier 1, Biomedical Imaging.

2015: Member, Advisory Committee, Montreal International, Big Data.

2014–2015: Representative for Concordia University on Big Data Analytics Consortium.

From 2006–2010 I was Vice-President of Concordia University Faculty Association. This was during negotiations of the Collective Agreement.

From 2006–2009 I was an alternate representative for CUFA on the University Salary Committee.

From 2002–2006, I was representative of Concordia University on the scientific panel of the Quebec Bioinformatics Network at Genome Quebec.

Member, Steering Committee for Centre for Structural and Functional Genomics: 1999–now.

Member, Executive of *Centre Interuniversitaire en Calcul Mathématique Algébrique*: 1996–1999.

Vice-Director, Computing, *Centre Interuniversitaire en Calcul Mathématique Algébrique*: 1996–1999.

## Service to the Faculty

Member, ENCS Faculty Council, 2014–2016, 2018–2020.

Member, Ad hoc Committee on High Performance Computing.

Director, ENCS Faculty Data Science Research Centre, 2015–now.

## Service to Department

Undergraduate Program Director, Computer Science, 2016–2020.

Acting Chair, Department of Computer Science & Software Engineering: 2017-07-24 to 2017-08-04.

Chair, Department Appraisal Committee, 2013–2015.

Member, ENCS Faculty Council, 2014–2016, 2018–2020.

Member, Department Ethics Committee, 2020–now.

Member of Department Research Committee: 2011–2013.

Member of Department Tenure Committee: 1995–now.

Member, Department Self-Appraisal Committee: 1994–1995, 2001–2003.

Chair, Department Hiring Committee: 2007–2008, 2015–2016.

Chair, Department Personnel Committee: 1997–1998.

Member, Department Personnel Committee: 1996–1998, 2014–2016, 2017–2019.

Member, Department Elections Committee: 1996–1996.

Member, Department Academic Planning and Priorities Committee: 1994–1995.

Member, Software Engineering Curriculum Committee: 1999–2001.

Member, Faculty Adhoc Committee on Software Engineering Curriculum: 1997–1998.

Member, Curriculum Committee: 1994–1995, 1999–2001.

Member of the Graduate Advisory Committee: 1995–1997, 2008–2010, 2011–2016.

Member of the Diploma Advisory Committee: 1997–1998.

Member of the Co-op Committee: 1994–1998.

Member of the Undergraduate Advisory Committee: 1992–1994, 1999–2002.

Year Director, Basser Department of Computer Science, University of Sydney: 1989 (CS Honours), 1986–1988 (CS3), 1984 (CS3).

As a year director in Computer Science at the University of Sydney, I served on the department's executive committee, which reviewed all recommendations from the teaching, research, and resources committees.

## Service to Community

Member, Review committee, proposed Bachelor of Science in Data Sciences and Analytics, Brock University (September–October 2020).

Member, NSERC Genomics Projects Selection Panel (July 2001–July 2002).

Member, NSERC site visit committee, Industrial Chair (January 2003),

Member, NSERC site visit committee, Major Facilities Access (January 2003).

Research Grant Reviewer: Natural Sciences and Engineering Research Council of Canada (NSERC), National Science Foundation (NSF), Australian Research Council (ARC), Michael Smith Foundation for Health Research, University of Queensland.

Associate Editor, Journal of Microbial Informatics and Experimentation: 2010–2014.

Associate Editor, Journal of Applicable Algebra in Engineering, Communication and Computing: 1998–2003.

Acting editor for special issue of Journal of Symbolic Computation: 1996–1997.

Paper Reviewer: ACM Computing Surveys, Software — Practice and Experience, Journal of Symbolic Computation, Discrete Mathematics Journal, Conference on Semantics in Healthcare and Life Sciences, Langages et Modèles à Objets, International Symposium on Symbolic and Algebraic Computation, International Conference on Artificial Intelligence and Symbolic Computation, Applicable Algebra and Error-Correcting Codes, Formal Power Series and Algebraic Combinatorics, Algebraic Methodology and Software Technology.

Programme Committee Member: Semantic Web Applications and Tools for Healthcare and Life Sciences (2018), International Database Engineering & Applications Symposium (2016, 2017, 2018), Canadian Semantic Web Working Symposium (2006), Workshop on Cluster Security (2006), Asia-Pacific Conference on Software Quality (2001), International Conference on Scientific and Statistical Database Management (2001), Symposium on Generative and Component-Based Software Engineering (2002, 2001, Co-chair 2000), Langages et Modèles à Objets (2000), International Symposium on Symbolic and Algebraic Computation (1994), International Conference on Artificial Intelligence and Symbolic Computation (2002, 2000, 1996).

Organizing Committee Chair: Semantic Trilogy 2013, Canadian Semantic Web Symposium (2013), International Conference on Biomedical Ontology (2013), International Conference on Data Integration in Life Science (2013).

Organizing Committee Member: Session chair and organizer for *Fungal Genome Bioinformatics — Feeding the Proteomics Machine* at 2nd International Fungal Proteomics Symposium (2006), Workshop on Knowledge-Based Bioinformatics (Concordia 2005), Workshop on Generative Programming at Conference on Object-Oriented Programming, Systems, Languages and Applications (2001), Workshop on Generative Techniques in Product Lines at International Conference on Software Engineering (2001), Workshop on Generative Programming at European Conference on Object-Oriented Programming (2001), Workshop on Generative Techniques for Product Lines, at First Software Product Line Conference (2000), Workshop on Managing and Integrating Biochemical Data (2000), Workshop on Computation of Biochemical Pathways and Genetic Networks (1999), International Symposium on Symbolic and Algebraic Computation (Concordia, 1995).

## Visiting Positions

2017: Visitor, Computer Science & Engineering, University of New South Wales, Australia

2016/2017: Visitor, Computer Science & Software Engineering, University of Western Australia

2010/2011: Sabbatical Visitor, Machine Learning Group, Waikato University, New Zealand

1999: Visiting Scientist, European Media Lab, Heidelberg, Germany

1999: Visitor, Multimedia Database Systems Group, RMIT, Melbourne, Australia

1998: Visiting Professor, Institut für Algorithmen und Kognitive Systeme, Universität Karlsruhe, Germany

1991: Visiting Scientist, Computer Science, Concordia University

1990: Visiting Professor, Lehrstuhl II für Mathematik (Informatik), Universität Bayreuth, Germany

1985: Visiting Scholar, Computer and Information Sciences, University of Delaware, USA

## Consulting

August 2000: HiCom Data Systems, Montreal. Guidance on extensibility in software architectures.

June–August 1999: European Media Lab, Heidelberg. Consulting on database technology for simulation of biochemical pathways.

June–August 1997, February–May 1998: Revenue Canada. Technical audit of R&D claim for object-oriented technology.

February 1995: Famic-Talis, Inc, Montreal. Consulting on object-oriented design and design patterns.

## Patents

**PCT-16.** *Cellulose-degrading enzyme composition comprising GH16*, Christopher M.D. Hill, John J. Tomashek, James A. Lavigne, Sandra Mortimer, Reginald Storms, Adrian Tsang, Greg Butler, Justin Powlowski, PCT/CA2013/050421

**PCT-15.** *Novel cell wall deconstruction enzymes of Malbranchea cinnamomea, Thielavia australiensis, and Paecilomyces byssoclamydoides, and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2014/050228

**PCT-14.** *Novel cell wall deconstruction enzymes of Amorphotheca resinae, Rhizomucor pusillus, and Calcarisporiella thermophila, and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2014/050024

**PCT-13.** *Novel cell wall deconstruction enzymes of Thermoascus aurantiacus, Myceliophthora fergusii (Corynascus thermophilus), and Pseudocercospora herpotrichoides and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2013/050778

**PCT-12.** *Cell wall deconstruction enzymes of Myceliophthora fergusii (Corynascus thermophilus) and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/071465

**PCT-11.** *Cell wall deconstruction enzymes of Thermoascus aurantiacus and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/071466

**PCT-10.** *Cell wall deconstruction enzymes of Pseudocercospora herpotrichoides and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/071463

**PCT-9.** *Novel cell wall deconstruction enzymes of Scytalidium thermophilum, Myriococcum thermophilum and Aureobasidium pullulans, and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2013/050434

**PCT-8.** *Cell wall deconstruction enzymes of Aureobasidium pullulans and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/061769

**PCT-7.** *Novel cell wall deconstruction enzymes of Myriococcum thermophilum and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/061767

**PCT-6.** *Novel cell wall deconstruction enzymes of Scytalidium thermophilum and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/EP2013/061768

**PCT-5.** *Cellulose-degrading enzyme composition comprising GH16*, Christopher M.D. Hill, John J. Tomashek, James A. Lavigne, Sandra Mortimer, Reginald Storms, Adrian Tsang, Greg Butler, Justin Powlowski, PCT/CA2013/050421

**PCT-4.** *Cell wall deconstruction enzymes of Thermomyces lanuginosus and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2012/050200; PCT/EP2012/055671

**PCT-3.** *Novel cell wall deconstruction enzymes of Talaromyces thermophilus and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, PCT/CA2012/050198; PCT/EP2012/055654

**PCT-2.** *Novel cell wall deconstruction enzymes and uses thereof*, Adrian Tsang, Justin Powlowski, Gregory Butler, Reginald Storms, PCT/CA2012/050003; PCT/EP2012/050130

**PCT-1.** *Novel xylanase enzymes XYL001 and XYL002 and uses thereof*. Tsang, A., Powlowski, J., Butler, G., Storms, R., Mohrmann, L., Mutsaers, J. PCT/EP2007/064475

## Patents — Provisional

**PP-23.** Provisional Patent (2014) *Novel cell wall deconstruction enzymes of Chaetomium thermophilum and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/930,129

**PP-22.** Provisional Patent (2014) *Novel cell wall deconstruction enzymes of Corynascus sepedonium and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/930,113

- PP-21.** Provisional Patent (2014) *Novel cell wall deconstruction enzymes of Thermomyces stellatus and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/930,119
- PP-20.** Provisional Patent (2014) *Novel cell wall deconstruction enzymes of Remersonia thermophila (Stilbella thermophila) and uses thereof*, Tsang, A., Powlowski, J., Butler, G.
- PP-19.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Paecilomyces byssochlamydoides and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/783,385
- PP-18.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Thelavia australiensis and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/783,313
- PP-17.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Malbarnchea cinnamomea and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/783,222
- PP-16.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Amorphototheca resiniae and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/753,573
- PP-15.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Calcarisporella thermophila and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/753,577
- PP-14.** Provisional Patent (2013) *Novel cell wall deconstruction enzymes of Rhizomucor pusillus and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/753,573
- PP-13.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Thermoascus aurantiacus and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/714,999
- PP-12.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Pseudocerosporella herpotrichoides and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/714,493
- PP-11.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Myceliophthora fergusii (Corynascus thermophilus) and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/714,485
- PP-10.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Aureobasidium pulalans and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/657,078
- PP-9.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Myriococcum thermophilum and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/657,075
- PP-8.** Provisional Patent (2012) *Novel cell wall deconstruction enzymes of Scytalidium thermophilum and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/657,082
- PP-7.** Provisional Patent (2011) *Novel cell wall deconstruction enzymes of Thermomyces lanuginosus and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/470836
- PP-6.** Provisional Patent (2011) *Novel cell wall deconstruction enzymes of Talaromyces thermophilus and uses thereof*, Tsang, A., Powlowski, J., Butler, G. USPR 61/470825
- PP-5.** Provisional Patent (2011) *Enzymes from TRAVE\_1 and TRAVE\_2 genes*, Tsang, A., Powlowski, J., Butler, G., Storms, R. USPR 61/430533
- PP-4.** Provisional Patent (2011) *Novel alkaline enzymes from Acremonium alcalophilum*, Tsang, A., Powlowski, J., Butler, G. USPR 61/466576
- PP-3.** Provisional Patent (2007) *Novel xylanase enzyme XYL001 and XYL002 and uses thereof*. Tsang, A., Powlowski, J., Butler, G., Storms, R., Mohrmann, L., Mutsaers, J. European Patent Office Patent No. 06126761.3-2401

**PP-2.** Provisional Patent (2005) *Novel cellulase and uses thereof*. Tsang, A., Powlowski, J., Butler, Gs., Storms, R. 15656-28USPR

**PP-1.** Provisional Patent (2005) *Novel triglyceride lipase and uses thereof*. Tsang, A., Bourbonnais, R., Butler, Gs., Storms, R., Varin, L. 15656-27USPR

## Declarations of Invention

**DOI-30.** Declaration of Invention (2014) *Cell wall deconstruction enzymes of Chaetomium thermophilum and their applications*, Tsang, A., Powlowski, J., Butler, G.

**DOI-29.** Declaration of Invention (2014) *Cell wall deconstruction enzymes of Corynascus sepedonium and their applications*, Tsang, A., Powlowski, J., Butler, G.

**DOI-28.** Declaration of Invention (2014) *Cell wall deconstruction enzymes of Thermomyces stellatus and their applications*, Tsang, A., Powlowski, J., Butler, G.

**DOI-27.** Declaration of Invention (2014) *Novel cell wall deconstruction enzymes of Remersonia thermophila (Stilbella thermophila) and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-26.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Paecilomyces byssochlamydoides and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-25.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Thelavia australiensis and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-24.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Malbarnchea cinnamomea and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-23.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Amorphotheca resiniae and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-22.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Calcarisporella thermophila and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-21.** Declaration of Invention (2013) *Novel cell wall deconstruction enzymes of Rhizomucor pusillus and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-20.** Declaration of Invention (2012) *Novel cell wall deconstruction enzymes of Thermoascus aurantiacus and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-19.** Declaration of Invention (2012) *Novel cell wall deconstruction enzymes of Pseudocerosporella herpotrichoides and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-18.** Declaration of Invention (2012) *Novel cell wall deconstruction enzymes of Myceliophthora fergusii (Corynascus thermophilus) and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

**DOI-17.** Declaration of Invention (2012) *Novel cell wall deconstruction enzymes of Aureobasidium pullalans and uses thereof*, Tsang, A., Powlowski, J., Butler, G.

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