CURRICULUM VITAE

Nancy Heckman
Department of Statistics
The University of British Columbia
Vancouver, BC
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EDUCATION

University or Institution	Degree	Subject Area	Dates
Tufts University	B.Sc.	Mathematics	1977
University of Michigan, Ann Arbor	M.A.	Statistics	1982
University of Michigan, Ann Arbor	Ph.D.	Mathematics	1982

EMPLOYMENT RECORD

Prior to coming to UBC

University, Company or Organization	Rank or Title	Dates
University of Michigan, Ann Arbor	Teaching Assistant	1977-1981
State University of New York, Stony Brook	Assistant Professor	1982-1985
Stanford University	Visiting Research Scientist	Summer 1985

At UBC

Rank or Title	Dates
Visiting Assistant Prof.	August 1984
Assistant Professor	July 1985
Associate Professor	July 1990
Professor	July 1998
Department Head	2008-2018
Professor Emeritus	July 2022

Graduate Students Supervised

Student Name	Program Type	Year		Principal Supervisor	Co-Supervisor(s)
		Start	Finish		
Janis Chang	M.Sc.		1988	Heckman/Petkau	
Yanling Zuo	M.Sc.		1990	Heckman	
Saulati Komungoma	M.Sc.		1992	Heckman/Zidek	
Leah Min Li	M.Sc.		1994	Heckman	
Xiaochun Li	Ph.D.		1996	Heckman	
Robert St. Aubin	M.Sc.	1997	1998	Heckman	Zidek
Jaroslaw Harezlak	M.Sc.	1997	1998	Heckman	
Huiying Sun	M.Sc.	1998	1999	Heckman	
Kayvan Najarian	Ph.D. Computing/EE	1998	2000	G. Dumont	M.S. Davies, Heckman
Isabella Ghement	Ph.D.	1998	2005	Heckman	
Wei Liu	Ph.D.	2001	2008	Heckman	
Wei Wang	Ph.D.	2003	2007	Heckman	
Xuekui Zhang	M.Sc.	2003	2005	Heckman	
Liangliang Wang	Ph.D.	2008	Changed supervisor 2010	Heckman	Salibian-Barrera
Camila Estevam de Souza	PhD	2008	2013	Heckman	
Vincent Zhai	MSc	2009	2011	Heckman	Wu
Wooyong Lee	MSc	2013	2014	Heckman/Greenwood	
Jeff Bone	MSc	2014	2016	Heckman	
Eric Fu	PhD	2015	2019	Heckman	
Ian Murphy	MSc	2019	2021	Heckman/Auger-Méthé	
Evan Sidrow	PhD	2020		Heckman/Auger-Méthé	
Xinmiao Wang	PhD	2020	did not finish	Heckman	Jiguo Cao
Shannon Edie	MSc	2021	2022	Heckman	David Rosen
Vinky Wang	MSc	2022	2024	Heckman	
Wakeel Kasali	MSc project	2023	2025	Heckman	Daniel McDonald

Summer 2013: supervised Jonathan Zhang, BSc, on USRA. Project: Visualizing genetic constraints and accompanying R package prinsimp.

Summer 2015: co-supervised (with pdf Camila de Souza) Helena Xu, BSc, on USRA. Project: Modeling Multi-level Power Usage with Latent States and Smooth Functions

Postdoctoral Fellows and Visiting Students
Chong Gu, Sept. 1989 - July 1990. Subject: Generalized cross-validation with replicates.
Ian McKay, 1993-94.
Cortland Griswold, 2006-8. Joint supervision with Richard Gomulkiewicz, Biology, Washington State University.
Simon Bonner, 2009-2010. Subjects: parameter cascading method of analysis in the presence of nuisance parameters, space-time analysis of weather patterns
Thor Veen, 2013-2014. Subject: functional data analysis of opsin expression.
Camila de Souza, 2013-14. Subject: hidden Markov models in functional data analysis.
Jan-Ole Kolsek, 2025. Subject: constrained densities in hidden Markov models.

Research Associates
Bing Li, July 1990. Subject: Testing convexity of a regression function.
Matt Wand, May-June, 1990. Subject: Local polynomial smoothing in generalized linear models.

AWARDS AND DISTINCTIONS

International Statistical Institute, elected as Ordinary Member, 1999.
American Statistical Association Fellow, 2001.
IMS Fellow, 2003.

The Canadian Journal of Statistics Award for Best Paper

- 1997, for “Line transects of two-dimensional random fields: estimation & design”, by N Heckman and J Rice.
- 2000, for “Penalized Regression with Model Based Penalties”, by N Heckman and JO Ramsay.
- 2023, for “Modelling multi-scale state-switching functional data with hidden Markov models”, by E Sidrow, N Heckman, SME Fortune, A Trites, I Murphy, and M Auger-Méthé.

For a PhD student I supervised:
Camila de Souza, *Journal of Nonparametric Statistics’* Best Student Paper Award for her paper "Switching nonparametric regression models”, 2015.

PUBLICATIONS

Publications Record

*(**bolded names** are students or postdoctoral fellows)*

REFEREED PUBLICATIONS

Journals

1. Heckman, N. "A Local Limit Theorem for a Biased Coin Design for Sequential Tests", *Annals of Statistics*, Vol. 13, #2, 785-788 (1985a).
2. Heckman, N. "A Sequential Probability Ratio Test Using a Biased Coin Design", *Annals of Statistics,* Vol. 13, #2, 789-794 (1985b).
3. Heckman, N. "Spline Smoothing in a Partly Linear Model", *Journal of the Royal Statistical Society, Series B.*, Vol. 48, 244-248 (1986).
4. Heckman, N. "Repeated Significance Tests with Biased Coin Allocation Schemes", *Probability Theory & Related Fields,* Vol. 73, 627-635 (1986).
5. Heckman, N. "Robust Design in a Two Treatment Comparison in the Presence of a Covariate", *Journal of Statistical Planning and Inference*, Vol. 16, 75-81 (1987).
6. Heckman, N., "Minimax Estimates in a Semiparametric Model", *Journal of the American Statistical Association,* Vol. 83, 1090-1096 (1988).
7. Kirkpatrick, M. and Heckman, N., "A quantitative genetic model for growth, shape, reaction norms, and other infinite-dimensional characters", *Journal of Mathematical Biology*, Vol. 27, 429-450 (1989).
8. Heckman, N. and Woodroofe, M. "Minimax Bayes Estimation in Nonparametric Regression", *Annals of Statistics,* Vol. 19, #4, 2003-2014 (1991).
9. Heckman, N. "Bump Hunting in Regression Analysis", *Statistics and Probability Letters*, Vol. 14, 141-151 (1992).
10. **Gu, C.**, Heckman, N. and Wahba, G. "A Note on Generalized Cross Validation with Replicates", *Statistics and Probability Letters,* Vol. 14, 283-287 (1992).
11. Price, T., Schluter, D. and Heckman, N. "Sexual Selection When the Female Directly Benefits". *Biological Journal of the Linnean Society,* Vol. 48, 187-211 (1993).
12. Fan, J., Heckman, N. and Wand, M. "Local Polynomial Smoothing in Generalized Linear Models", *Journal of the American Statistical Association*, Vol. 90, 141-150 (1995).
13. Heckman, N. and **Li, B**. "Nonparametric Tests for Bounds on the Derivative of a Regression Function", *The Institute of Statistical Mathematics*, Vol. 48, 315-336 (1996).
14. Heckman, N. and Rice, J. "Line Transects of Two Dimensional Random Fields: Estimation and Design", *Canadian Journal of Statistics*, Vol. 25, 481-501 (1997).
15. Heckman, N. and Ramsay, J.O. "Penalized Regression with Model Based Penalties", *Canadian Journal of Statistics*, Vol. 28, 241-258 (2000).
16. Heckman, N. and Zamar, R. "Comparison of Shapes of Regression Functions". *Biometrika*, Vol. 87, 135-144 (2000).
17. Hall, P. and Heckman, N. "Testing for Monotonicity of a Regression Mean Without Selecting a Bandwidth", *Annals of Statistics*, Vol. 28, 20-39 (2000).
18. **Harezlak, J.** and Heckman, N. "CriSP, a Tool for Bump Hunting", *Journal of Computational and Graphical Statistics*, Vol 10, 713-729 (2001).
19. Hall, P. and Heckman, N. "Estimating and depicting the structure of a distribution of random functions", *Biometrika* Vol. 89: 145-158 (2002).
20. **Li, X** and Heckman, N. "Local linear forecasting", *Journal of Nonparametric Statistics* 15: 565-578 (2003).
21. Gijbels, I. and Heckman, N. "Nonparametric testing for a monotone hazard function via normalized spacings", *Journal of Nonparametric Statistics* Vol 16, 463-478 (2004).
22. **Ghement, I,** Heckman, N and Petkau, A. J. "Seasonal confounding and residual correlation in analyses of health effects of air pollution", *Environmetrics* 2007 Vol 18, 375-394 (2007).
23. **Griswold, C.** Gomulkiewicz, R, and Heckman, N. "Statistical power and hypothesis testing with functional data". *Evolution* 62: 1229-1242 (2008).

24. Heckman, N. “The theory and application of penalized least squares methods or Reproducing Kernel Hilbert Spaces made easy”, *Statistics Surveys* 6: 113-141 (2012).
25. Carter, P.A., Gilchrist, G., Gomulkiewicz, R., B., Heckman N, Houle, H., Kirkpatrick, M., Kingsolver, J., Meyer, K., Marquez, E. and Stinchcombe, J. “Function valued traits in evolutionary biology”, *TREE Trends in Evolutionary Biology* 27: 637-647 (2012).
26. **Gaydos, T**, Heckman, N, Kingsolver, J and Marron, J.S. “Visualizing genetic constraints”, *Annals of Applied Statistics* 7: 860–882 (2013).
27. **Bonner, S**, Newlands, N and Heckman, N. “Modeling regional effects of teleconnections on BC climate through functional data analysis” *Environmental and Ecological Statistics,* 21(1), pp. 1-26 (2014).
28. Heckman, N, Lockhart, R, and **Nielsen, J**. “Penalized regression, mixed effects models and appropriate modelling”, *Electronic Journal of Statistics* **7**: 1517-1552 (2013).
29. **De Souza, Camila** and Heckman, N. “Switching nonparametric regression models”, *Journal of Nonparametric Statistics* 26: 617—637 (2014).
30. **Lei, E**, Yao, F, Heckman, N and Meyer, K. “Functional data model for genetically related individuals with application to cow growth”, *Journal of Computational and Graphical Statistics* (2014).
31. **Zhang, J**, Heckman, N, Cubranic, D, Gaydos, T and Marron J.O. “Prinsimp: examples and details of the R package that accompanies Gaydos et al 2013", *R-Journal* 6: 27—42 (2014).
32. Kingsolver, Joel, Heckman, Nancy, **Zhang, Jonathan**, Carter, Patrick, Knies, Jennifer, Stinchcombe, John R. and Meyer, Karin. “Genetic variation, simplicity, and evolutionary constraints for function-valued traits”, *The American Naturalist*. 185: 166—181 (2015).
33. **Rennison, D**, **Owens, G**, Heckman, N, Schluter, D, **Veen, T**. “Rapid adaptive evolution of color vision in the three-spine stickleback radiation”, *Proceedings of the Royal Society B Biological Sciences*: 283: 20160242 (2016).
34. **Lee, W**, Greenwood, P, Heckman, N and Wefelmeyer W. “Pre-averaged kernel estimators for the drift function of a diffusion process in the presence of microstructure noise”, *Statistical Inference for Stochastic Processes*, 20: 237–252 (2017).
35. **Lenzi, A**, **de Souza, C**, Dias, R, Garcia, N and Heckman, N. “Analysis of aggregated curves from mixed populations”, *Environmetrics*. 28 (2017).
36. **de Souza, C,** Heckman, N, **Xu, H**. “Modelling multi-level power usage with latent states and smooth functions”, *Canadian Journal of Statistic,* 45: 442-460 (2017).
37. Gomulkiewicz, R, Kingsolver, J, Carter, P and Heckman, N. “Variation and evolution of function-valued traits”, *Annual Review of Ecology, Evolution, and Systematics***,** 49:1, 139-164 (2018).
38. **Fu E**, Heckman N. “Model-based curve registration via stochastic approximation EM algorithm”, *Computational Statistics and Data Analysis*, 131: 159-175 (2019).
39. **Sidrow E**, Heckman N, Fortune SME, Trites A, Murphy I, and Auger-Méthé M. “Modelling multi-scale state-switching functional data with hidden Markov models”, *Canadian Journal of Statistics*. 50: 1 (2022).
40. **Sidrow E**, Heckman N, McRae TM, Volpov BL, Trites AW, Fortune SME, Auger-Méthé M. “Incorporating sparse labels into hidden Markov models using weighted likelihoods improves accuracy and interpretability in biologging studies”, *PloS One*, (2025).
41. **Sidrow E**, Heckman N, Bouchard-Cote A, Fortune SME, Trites AS, Auger-Méthé, M. “Variance-reduced stochastic optimization for efficient inference of hidden Markov models”, *Journal of Computation and Graphical Statistics*, 41:1, 222-238 (2025).
42. **Lee TY,** Zidek JV and Heckman N. “Nondimensionalizing physical and statistical models: a unified approach”, *Statistical Science* (to appear).

Conference Proceedings (refereed)

1. Heckman, N. "Minimax Bayes Estimation, Penalized Likelihood Methods, and Restricted Minimax Estimation". *Nonparametric Functional Estimation and Related Topics*, ed. George Roussas, Kluwer Academic Publishers (1991).
2. Ramsay, J.O., Heckman, N., and Silverman, B.W. "Spline Smoothing with Model-Based Penalties", *Behavior Research Methods, Instruments, and Computers*, Vol. 29, 99-106 (1997).
3. Ramsay, J.O. and Heckman, N. "Some Theory for L-Spline Smoothing", Workshop on Spline Functions and the Theory of Wavelets, Centre de Recherches Mathematiques. Vol. 18, (1999)
4. **Najarian, K.,** Dumont, G., Davies, M., and Heckman, N. “Learning of Nonlinear FIR Models under Uniform Distribution”, The IEEE Proceedings of the American Control Conference, 864-869 (June, 1999).

5. **Najarian, K**., Dumont, G., Davies, M., Heckman, N. and Motabar, I. "Complexity Control of Sigmoid Neural Networks Using Learning Theory, Part I: Theory", International Conference on Neural Networks, International Association of Science and Technology for Development, (May 2000).
6. **Najarian, K.**, Dumont, G., Davies, M., Heckman, N. and Motabar, I. "Complexity Control of Sigmoid Neural Networks Using Learning Theory, Part II: Application in Minimum-Complexity Neural Modeling of Two-Dimensional Scanning System", International Conference on Neural Networks, International Association of Science and Technology for Development, (May 2000).
7. **Najarian, K.**, Dumont, G., Davies, M. and Heckman, N. "Neural ARX Models and PAC Learning. *Springer's Lecture Notes in Artificial Intelligence*, selected papers from The Thirteenth Canadian Conference on Artificial Intelligence, 2000.
8. **Najarian, K.**, Dumont, G., Davies, M., and Heckman, N. "PAC Learning in Nonlinear FIR Models", International Journal of Adaptive Control and Signal Processing (2001).
9. Heckman, N. "Functional data analysis in evolutionary biology", Recent Advances in Nonparametric Statistics, 49-60, Editors: Akritas and Politis, Elsevier (2004).

NON-REFEREED PUBLICATIONS

Journals

1. Heckman, N. CJS discussion paper: Comments on "Flexible regression modeling with adaptive logistic basis functions" by P.M. Hooper, *Canadian Journal of Statistics*, Vol 29, 368-369. (2001).
2. Heckman, N. "Comments on: Dynamic relations for sparsely sampled Gaussian processes". *TEST* Vol 19, 46-49 (2010).

Other

1. Heckman, N. "A conversation with Jim Zidek", *Liaison*, newsletter of the Statistical Society of Canada (2002).
2. Cubranic, D, **Zhang, J**, Heckman, N, Travis Gaydos, T and Marron, J.S. Prinsimp, R-package (2013)
3. **Diluvi GC**, **Isberg S**, Dunham B, Heckman N, Lee, M, "Using online student focus groups in the development of new educational resources", arXiv:2304.00149 (2023).

BOOKS

Chapters

Dean, C.B., Heckman, N., and Reid, N. `Practical Suggestions for Developing as an Academic Leader', in *Leadership and Women in Statistics*, Chapman and Hall, Y. Gel, A.Golbeck, and I. Olkin (eds.), (2014).

WORK SUBMITTED

1. **Koslik J-O**, **Dupont, F**, Auger-Méthé, M, Marcoux, M, Hussey, N, and Heckman, N. "Flexible unimodal density estimation in hidden Markov models", arXiv:2511.17071v2, submitted to *Methods in Ecology and Evolution*.
2. Dunham B, Heckman N, Lee M, Whitlock M, and Yapa G. "Assessment of sampling variation applets during development", submitted to *Teaching Statistics*, Special Edition for UKCOTS.