

Curriculum Vitae, Helle Sørensen (March 2019)

Personal data

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Home adress: Helle Sørensen, Svanemosegårdsvej 7-1, DK-1967 Frederiksberg C.

Birthday: May 25, 1971.

Education

PhD in Statistics, University of Copenhagen (October 2000). Thesis title: *Inference for Diffusion Processes and Stochastic Volatility Models*.

MSc in Statistics, University of Copenhagen (March 1997).

BSc in Mathematics-Economics from University of Copenhagen (June 1993).

Positions

Professor, head of Data Science Lab (Statistics), Department of of Mathematical Sciences, University of Copenhagen, since March 2018.

Professor MSO, head of Laboratory for Applied Statistics, Department of Mathematical Sciences, University of Copenhagen, 2013–2018.

Associate Professor, Department of Mathematical Sciences, University of Copenhagen, (2008–2013)

Assistant professor (2003–2005) and associate professor (2005–2008), Department of Natural Sciences, Faculty of Life Sciences, University of Copenhagen.

Assistant Professor, Department of Economics, University of Copenhagen, 2002–2003.

Visiting scholar, Department of Statistics, UC California, Berkeley, 1998–1999

PhD student, amanuensis, assistant professor, Department of Mathematical Sciences, University of Copenhagen, 1997–2001.

Periods of leave

Maternity leave May 2001–January 2002 and April 2005–November 2005.

Scientific focus areas

Functional data analysis; models with random effects; statistical inference for stochastic processes (in particular SDE models); biostatistics; statistical applications in biology and related sciences.

Grants

Research project from The Danish Council for Independent Research, Natural Sciences (FNU), Quantile regression for longitudinal functional data, 2017–2020, DKK 2,177,699, principal investigator.

Research project from The Danish Council for Independent Research, Natural Sciences (FNU), Statistical inference for time series of counts, 2013–2016, DKK 358.560, principal investigator.

Academic awards

Scandinavian Journal of Statistics Prize for for young researchers, 2002.

Nominated as “teacher of the year” at Faculty of Science, University of Copenhagen, 2014 (by students) and 2019 (by department).

Other professional activities

Reviewer for *Annals of Statistics*, *Annals of the Institute of Statistical Mathematics*, *Bernoulli*, *Journal of Applied Statistics*, *BMC Medical Research Methodology*, *Latin American Journal of Probability and Mathematical Statistics*, *Probability Theory and Related Fields*, *Scandinavian Journal of Statistics*, *Statistical Inference for Stochastic Processes*, *Epidemiology*, *ESAIM Probability & Statistics*, *Statistics in Medicine*, *Biometrics*.

Reviewer for the Netherlands Organisation for Scientific Research (NWO).

Member of assessment committees for assistant, associate and full professorships at Aalborg University, Copenhagen Business School, University of Copenhagen, University of Oslo, Swedish University of Agricultural Sciences.

Member of assessment committees regarding PhD degrees at Århus University, University of Copenhagen, University of Oslo, Roskilde University, Linnaeus University, Politecnico di Milano, Umeå University.

External examiner (censor) at Aalborg University, Aarhus University, University of Copenhagen, Roskilde University, University of Southern Denmark.

Organizer of seminars in the statistics group at Department of Mathematical Sciences, University of Copenhagen (2010–2013).

Member of program committee for 2015 useR! conference in Ålborg Invited session organizer at 6th Nordic-Baltic Biometric Conference 2017 in Copenhagen. Organizer of workshop of functional data analysis in Copenhagen, 2016. Co-organizer of meetings for the Danish Society for Theoretical Statistics (2000–2008, 2015).

Member of the organizing committee for the Nordstat conference in Rebild, Denmark, 2008 and for the Nordstat conference in Copenhagen, Denmark, 2016.

Planning, organization, and evaluation of the new study, “Natural Sciences and IT” (2009–2011).

Member of the committees regarding communication (since 2013), library (2010), high school teaching (2009–2013), member of LSU (since 2013), all at Department for Mathematical Sciences, University of Copenhagen.

Treasurer and member of the board of the Danish Society for Theoretical Statistics (DSTS), 2004–2008.

Management experience

Head of Laboratory for Applied Statistics (2013–2018) and Data Science Lab (Statistics), the Faculty of Sciences, University of Copenhagen (since 2018)

Experience with statistical consultancy

Extensive experience with statistical consultancy, in particular from my involvement in the Data Science Lab and Laboratory for Applied Statistics, and my position at the LIFE Science Faculty (University of Copenhagen). I have, among others,

- co-supervised three PhD students in animal and veterinary sciences
- taught PhD courses and supervised around 25 exam projects where the students came with data from their own research
- had a large number of consultancy meetings for students (all levels)
- collaborated with students and researchers from biology, plant science, animal science, veterinary science, nutrition science.

Teaching

Formal training

I passed a course on university pedagogics (adjunktpædagogikum, 2003–2004)

University courses

I have taught a total of ≈ 20 different university courses (≈ 50 course runs). The list includes introductory and advanced courses with an applied focus for students and PhD students from the applied sciences, as well as introductory and mathematically advanced courses for mathematics and statistics students. I always get excellent evaluations from the students. I have been the co-developer of ten courses and have extensive experience with course organization and administration.

Teaching for high school students and teachers

I have organized and taught a course for high school teachers, and give 3–5 talks to high school students every year. I have been involved in a course related to third year projects (SRP) at high school, and written a chapter for a book for high school students.

Development of teaching material

I have written a textbook about introductory statistics for life science students, two sets of lecture notes (more than 140 pages each), a chapter for a textbook in statistics for high school students, numerous shorter lecture notes, software guides, *etc.*

Supervision

PhD students (all from University of Copenhagen)

- Phillip Bredahl Mogensen (started 2019). Faculty of Science (co-supervisor).
- Maria Laura Battagliola (started 2017). Quantile regression for longitudinal functional data. Faculty of Science (principal supervisor).
- Andrea Louise Nissen (graduated 2017). Movement Symmetry and the Influence of Long-term Exercise: a Study in Elite Endurance Horses at Competitions. Faculty of Health Sciences (co-supervisor).

- Seyed Nourollah Mousavi (graduated 2016), Analysis of Functional Data with Focus on Multinomial Regression and Multilevel Data. Faculty of Science (principal supervisor).
- Nina Breinegaard (graduated 2013), Robustness and Model Validation in Statistical Models for Binary and Ordinal Clustered Data. Faculty of Health Sciences (co-supervisor).
- Maj Halling Thomsen (2007–2011), Application of Accelerometric Data from Trotting Horses for Quantification and Detection of Lameness. Faculty of Life Sciences (co-supervisor).
- Anders Bjerring Strathe (2006–2009), Stochastic Modelling of Feed Intake, Growth and Body Composition in Pigs. Faculty of Life Sciences (co-supervisor).

Master's thesis students (all from Department of Mathematics, University of Copenhagen)

- Franziska Juchmes (expected 2019).
- Pernille Juul Jørgensen (2019). Predicting advanced fibrosis and examining fibrosis stage transitions using a Transition Markov Model.
- Nadia Okholm (2019). Subgroup identification in a cardiovascular outcome study.
- Christian Bjerregård Øland (2018). Associations between vaccines and mid upper arm circumference – a longitudinal approach.
- Emil Hvitfeldt Hansen (2017). Quantile regression with longitudinal data.
- Cecilie Laurberg Iversen (2017). Model averaging in clinical drug development. Collaboration with Lundbeck A/S.
- Trine Hansen (2017). Statistical properties of some approaches for assessing donor related risks of adverse health outcomes in blood recipients. Collaboration with Statens Serum Institut.
- Majken Hamann Sey (2016). Bivariate outcomes in clinical trials. Collaboration with Lundbeck A/S.
- Gitte Lerche Aalborg (2015). Evaluation of glucaemic response in subjects with type 1 diabetes — do continuous glucose measurements reflect the plasma glucose? Collaboration with Novo.
- Line Kühnel (2015), Inference for Functional Data — the Interval Testing Procedure.
- Niels Olsen (2015), Aspects of multivariate longitudinal data analysis.
- Nanna Leonora Lausvig (2015), Missing data in longitudinal experiments. Collaboration with Lundbeck A/S.
- Christopher Moesgaard Albertsen (2014), Determining depth preferences of turbot. Collaboration with DTU Aqua.
- Rene Aakær Jensen (2013), Markov likelihood estimation for time series of counts.
- Eva Leini (2012), Characterization of the shape of electroactive polymer actuators.
- Simon Nitschky Schmidt (2012), Change point analysis.

- Kåre Sylvest Jacobsen (2012), Statistisk analyse af børns tandfrembrudstider. Collaboration with Statens Serum Institut.
- Martin Theil Jensen (2010), Analyse af flersimensionale funktionelle data.
- Mia Klinten Grand (2010), Cumulative residuals for marginal models.
- Lars Lau Hansen (2010, co-supervisor), 2D Functional Data Analysis with Applications to Image Analysis.
- Nina Breinegaard (2009), Robustness of Generalized Linear Mixed Models Against Misspecified Random Effects Distributions.

Supervision of Bachelor's theses and other projects

- 2009–2018: Approximately 50 BSc theses and 10 exam projects in applied statistics (statistics students).
- 2003–2008: Approximately 25 exam projects in applied statistics for students from plant science, animal science, veterinary medicine and related fields.

Publications

Textbooks

1. C.T. Ekstrøm, H. Sørensen (2015), Introduction to Statistical Data Analysis for the Life Sciences, 2nd edition. Taylor & Francis group/CRC Press.
2. T. Martinussen, I.M. Skovgaard, H. Sørensen (2012), A First Guide to Statistical Computations in R. Biofolia.
3. C.T. Ekstrøm, H. Sørensen (2011), Introduction to Statistical Data Analysis for the Life Sciences. Taylor & Francis group/CRC Press.

Peer-reviewed journal publications

4. H. Sørensen (2019). Independence, successive and conditional likelihood for time series of counts. *Journal of Statistical Planning and Inference*, **200**, 20–31.
5. C. Kosawang, H. Sørensen, E.D. Kjær, A. Dilokpimol, L.V. McKinney, D.B. Collinge, L.R. Nielsen (2019), Defining the twig fungal communities of *Fraxinus* species and *Fraxinus excelsior* genotypes with differences in susceptibility to ash dieback. *Fungal Ecology*, **42**, 10085.
6. N.P. Kocatürk, K. Zwart, S. Bruun, L.S. Jensen, H. Sørensen, L. Brussaard (2019), Recovery of nutrients from the liquid fraction of digestate: Use of enriched zeolite and biochar as nitrogen fertilisers. *Journal of Plant Nutrition and Soil Science*, **182**, 187–195.
7. S. Jacobsen, G.J. Moraes, H. Sørensen, L. Sigsgaard (2019), Organic cropping practice decreases pest abundance and positively influences predator-prey interactions. *Agriculture, Ecosystems and Environment*, **272**, 1–9.

8. M. Nicolaisen, N.D. Cuong, J. Herschend, P. van Du, J. Sørensen, L.C. Loan, H. Sørensen, B. Jensen, S. Olsson (2018). Biological control of rice sheath blight using hyphae-associated bacteria - development of a in planta screening assay to predict BCA performance under field conditions. Accepted for *BioControl*.
9. S.N. Mousavi, H. Sørensen (2018), Functional logistic regression: A comparison of three methods. *Journal of Statistical Computation and Simulation*, **88**, 250–268.
10. A.B. Muñoz, W.J. Eldridge, N.M. Jakobsen, H. Sørensen, A. Wax, M. Costa (2018). Cellular shear stiffness reflects arsenic-induced transformation. *Carcinogenesis*, **39**, 109–117.
11. Y.Y.K. Kalkhajeh, H. Sørensen, B. Huang, D.-X. Guan, J. Luo, W. Hu, P.E. Holm, H.C.B. Hansen (2018), DGT technique to assess P mobilization from greenhouse vegetable soils in China: A novel approach. *Science of the Total Environment*, **630**, 331–339.
12. M. Hansen, T. Bang-Andreasen, H. Sørensen, M. Ingerslev (2017), Micro vertical changes in soil pH and base cations over time after application of wood ash on forest soil. *Forest Ecology and Management*, **406**, 274–280.
13. S.N. Mousavi, H. Sørensen (2017), Multinomial functional regression with wavelets and LASSO penalization. *Econometrics and Statistics*, **1**, 150–166.
14. H. Sørensen (2017). Diffusion-type models with given marginal distribution and autocorrelation function. In *Inference, Asymptotics, and Applications: Selected Papers of Ib Michael Skovgaard, with Introductions by his Colleagues*, edited by N. Reid and T. Martinussen.
15. S.J. Traving, O. Rowe, N.M. Jakobsen, H. Sørensen, J. Dinasquet, C.A. Stedmon, A. Andersson, L. Riemann (2017), The effect of increased loads of dissolved organic matter on estuarine microbial community composition and function. *Frontiers in Microbiology*, **8**, Article 351. DOI: 10.3389/fmicb.2017.00351
16. S.J. Traving, M. Bentzon-Tilia, H. Knudsen-Leerbeck, M. Mantikci, J.L.S. Hansen, C.A. Stedmon, H. Sørensen, S. Markager, L. Riemann (2016). Coupling bacterioplankton populations and environment to community function in coastal temperate waters. *Frontiers in Microbiology*, **7**, Article 1533. DOI: 10.3389/fmicb.2016.01533
17. S. Christensen, H. Sørensen, K.R. Munk, T.P. Hauser (2016), A hybridisation barrier between two evolutionary lineages of *Barbarea vulgaris* (Brassicaceae) that differ in biotic resistances. *Evolutionary Ecology*, **30**, 887–904. DOI: 10.1007/s10682-016-9858-z.
18. C. Heimes, N. Agerbirk, H. Sørensen, T. van Mølken, T.P. Hauser (2016), Ecotypic differentiation of two sympatric chemotypes of *Barbarea vulgaris* (Brassicaceae) with different biotic resistances. *Plant Ecology*, **217**, 1055–1068. DOI: 10.1007/s11258-016-0631-8.
19. J.S. Madsen, H.L. Røder, J. Russel, H. Sørensen, M. Burmølle, S. Sørensen (2016), Co-existence facilitates interspecific biofilm formation in complex microbial communities. *Environmental Microbiology*, **18**, 2565–2574. DOI: 10.1111/1462-2920.13335.

20. H. Sørensen, B. Markussen, A. Tolver (2015), Discussion of “Analysis of Spatio-Temporal Mobile Phone Data: a Case Study in the Metropolitan Area of Milan” by P. Secchi, S. Vantini, and V. Vitelli. *Statistical Methods and Applications*, **24**, 321–324.
21. H. Mathiasen, H. Sørensen, J. Bligaard, P. Esbjerg (2015), Effect of temperature on reproduction and embryonic development of the cabbage stem flea beetle. *Journal of Applied Entomology*, **139**, 600–608. DOI: 10.1111/jen.12201
22. M. Prem, H.C.B. Hansen, W. Wenzel, L. Heiberg, H. Sørensen, O.K. Borggaard (2015). High spatial and fast changes of iron redox state and phosphorus solubility in a seasonally flooded temperate wetland soil. *Wetlands*, **35**, 237–246.
23. A. Tolver, H. Sørensen, M. Muller, S.N. Mousavi (2014), Analysis of Juggling Data: Registration Subject to Biomechanical Constraints. *Electronic Journal of Statistics*, **8**, 1856–1864. DOI: 10.1214/14-EJS937F
24. H. Sørensen, J. Goldsmith, L.M. Sangalli (2013), An introduction with medical applications to functional data analysis. *Statistics in Medicine*, **32**, 5222–5240.
25. H. Sørensen, A. Tolver, M.H. Thomsen, P.H. Andersen (2012), Quantification of symmetry for functional data with application to equine lameness classification. *Journal of Applied Statistics*, **39**, 337–360.
26. N. Cedergreen, H. Sørensen, C. Svendsen (2012), Can the joint effect of ternary mixtures be predicted from binary mixture toxicity results? *Science of the Total Environment*, **427–428**, 229–237.
27. J.L. Forman, B. Markussen, H. Sørensen (2011), Goodness of Fit based on Down-sampling with Applications to Continuous-Time Models. *Scandinavian Journal of Statistics*, **38**, 288–310.
28. A. Strathe, B. Nielsen, S. Klim, A. Danfær, H. Sørensen (2011), Population based growth curve analysis — a comparison between models based on ordinary or stochastic differential equations implemented in a nonlinear mixed effect framework. In D. Sauvant, J. Van Milgen, P. Faverdin, N. Friggens (editors), *Modelling nutrient digestion and utilization in farm animals*, 22–31, Wageningen Academic Publishers.
29. H. Sørensen, N. Cedergreen, J.C. Streibig (2010), A random effects model for binary mixture toxicity experiments. *Journal of Agricultural, Biological and Environmental Statistics*, **15**, 562–577.
30. M.H. Thomsen, A.B. Persson, A.T. Jensen, H. Sørensen, P.H. Andersen (2010), Agreement between accelerometric symmetry scores and clinical lameness scores during experimentally induced transient distension of the metacarpophalangeal joint in horses. *Equine Veterinary Journal*, **42**, 510–515.
31. M.H. Thomsen, A.T. Jensen, H. Sørensen, C. Lindegaard, P.H. Andersen (2010), Symmetry indices based on accelerometric data in trotting horses. *Journal of Biomechanics*, **43**, 2608–2612.
32. I. Mantzouni, H. Sørensen, R. O’Hara, B.R. MacKenzie (2010), Hierarchical modelling of temperature and habitat size effects on population dynamics of North Atlantic cod. *Journal of Marine Sciences*, **67**, 833–855.

33. A. Strathe, A. Danfær, A. Chwalibog, H. Sørensen, E. Kebreab (2010), A multivariate nonlinear mixed effect method for analyzing energy partition in growing pigs, *Journal of Animal Science*, **88**, 2361–2372.
34. A. Strathe, A. Danfær, H. Sørensen, E. Kebreab (2010), A multilevel nonlinear mixed-effects approach to model growth in pigs. *Journal of Animal Science*, **88**, 638–649.
35. A.B. Strathe, H. Sørensen, A. Danfær (2009), A new mathematical model for combining growth and energy intake in animals: the case of a growing pig. *Journal of Theoretical Biology*, **261**, 165–175.
36. J. Markvart, E. Rosenqvist, H. Sørensen, C.O. Ottosen, J.M. Aaslyng (2009), Canopy photosynthesis and time-of-day application of supplemental light. *HortScience*, **44**, 1284–1290.
37. H. Sørensen (2008), Small sample distribution of the likelihood ratio test in the random effects model. *Journal of Statistical Planning and Inference*, **138**, 1605–1614.
38. N. Cedergreen, A. Christensen, A. Kamper, P. Kudsk, S. Mathiassen, J.C. Streibig, H. Sørensen (2008), A review of independent action compared to concentration addition as reference models for mixtures of compounds with different molecular target sites. *Environmental Toxicology and Chemistry*, **27**, 1621–1632.
39. R. Belz, N. Cedergreen, H. Sørensen (2008), Hormesis in mixtures — can it be predicted? *Science of the Total Environment*, **404**, 77–87.
40. H. Sørensen, N. Cedergreen, I.M. Skovgaard, J.C. Streibig (2007), An isobole-based statistical model and test for synergism/antagonism in binary mixture toxicity experiments. *Environmental and Ecological Statistics*, **14**, 383–397.
41. N. Cedergreen, M. Abbaspoor, H. Sørensen, J.C. Streibig (2007), Is mixture toxicity measured on a biomarker indicative of what happens on a population level? *Ecotoxicology and Environmental Safety*, **67**, 323–332. This paper was featured as a "Highlighted Article", chosen for its outstanding scientific quality and relevance.
42. N. Cedergreen, P. Kudsk, S.K. Mathiassen, H. Sørensen, J.C. Streibig (2007), Reproducibility of binary-mixture toxicity studies. *Environmental Toxicology and Chemistry*, **26**, 149–156.
43. H. Sørensen (2004), Parametric inference for diffusion processes observed at discrete points in time: a survey. *International Statistical Review*, **72**, 337–354.
44. H. Sørensen (2003), Simulated likelihood approximations for stochastic volatility models. *Scandinavian Journal of Statistics*, **30**, 257–276. This paper was awarded the 2002 SJS prize.
45. H. Sørensen (2002), Estimation of diffusion parameters for discretely observed diffusion processes. *Bernoulli*, **8**, 491–508.
46. H. Sørensen (2001), Discretely observed diffusion processes: approximation of the continuous-time score function. *Scandinavian Journal of Statistics*, **28**, 113–122.

Misc publications

47. H. Sørensen (2019). Erfaringer med eksperimenter der genererer data til brug i undervisningen. Symposium for Anvendt Statistik, **41**, 224–235, Copenhagen.
48. Susanne Ditlevsen, Helle Sørensen og Per Kragh Andersen (2018). Sammenhænge, risici, behandlingseffekter — kan vi stole på forskningsresultaterne? *Practicus* (medlemsblad for Dansk Selskab for Almen Medicin), august 2018.
49. H. Sørensen (2014), Kvadratisk regression. Contribution to *Statistik M.A.* Jensen and U. Timm (textbook for high school in the series *Matema10k*), Frydenlund.
50. H. Sørensen, N. Cedergreen, I.M. Skovgaard, J.C. Streibig (2004), Mixtures of toxicants. Symposium for Anvendt Statistik, **26**, 210–219. Dept. of Sociology, University of Copenhagen.
51. H. Sørensen (2000), Inference for Diffusion Processes and Stochastic Volatility Models. Ph.D. thesis, Department of Mathematical Sciences, University of Copenhagen.
52. H. Sørensen (1997), Parameterestimation i diskret observerede diffusionsprocesser. Master's thesis, Department of Mathematical Sciences, University of Copenhagen.

Lecture notes (more than 50 pages)

53. S. Ditlevsen, H. Sørensen (2011), En introduktion til Statistik, 145 pages.
54. A.T. Jensen, H. Sørensen (2007), Lecture notes for “Applied Statistics”, 174 pages.

Manuscripts

55. Y.Y.K. Kalkhajeh, B. Huang, H. Sørensen, P.E. Holm, H.C.B. Hansen (2019), Sub-surface P mobilization from heavily-fertilized alkaline coarse-textured greenhouse vegetable soils in Southeast China. Submitted.
56. A.L. Nissen, P.H. Andersen, H. Sørensen, R. Buhl, M.H. Thomsen (2016), Acceleration-based trunk movement symmetry in elite endurance horses before and after competitions. In Nissen's PhD thesis.
57. A.L. Nissen, M.H. Thomsen, H. Sørensen, R. Buhl, P.H. Andersen, (2016), Trunk movement symmetry in relation to elimination or completion in elite endurance competitions. In Nissen's PhD thesis.
58. A.L. Nissen, M.H. Thomsen, H. Sørensen, R. Buhl, P.H. Andersen, (2016), Trunk movement symmetry after breaking-in and training: associations to initial symmetry, rider and days ridden. In Nissen's PhD thesis.
59. F.V. Christiansen, C.Ø. Rump, K. Trigwell, H. Sørensen (2016). Measuring dimensions of impact of university teacher development courses.
60. P.L. Nielsen, L. Andresen, S. Barsberg, H. Sørensen, A. Smith, A. Tietema, M. Holmstrup, I.K. Schmidt (2015), Does Climate Changes Affects Decomposition of Roots via Changes in Root Chemistry? In Nielsen's PhD thesis.