

Recent Advances in Conservation Genetics (ConGen Global)
January 5 - 15, 2025
Cheetah Conservation Fund Research and Education Centre
Otjiwarongo, Namibia

COURSE INFORMATION

Course Format

The Recent Advances in Conservation Genetics (ConGen Global) course is as an intensive 9-day practicum dedicated to the application of genomic technologies towards the conservation of biodiversity. Through a combination of lectures, discussions, and hands-on training tutorials, participants will learn the theory and practical application of evolutionary and population genomic analyses to conservation science. The course faculty represent an amazing group of people from around the world who will teach and share their current research and conservation stories, as well as interact with the course participants. The course has been running since 1996, with editions being held at different locations worldwide. The 2025 edition is being held at the Cheetah Conservation Fund in Otjiwarongo, Namibia.

Course Description

This course provides a survey of the theory, methods, and software used in conservation genomics research. Participants will learn how to handle bioinformatics pipelines and algorithms for analyzing next-generation sequencing data through lectures and hands-on computer tutorials.

Topics to be covered include:

- Study design for conservation genomic projects
- Overview of genome sequencing and other next-generation sequencing methods
- Read mapping and variant discovery
- Analysis of genetic structure
- Analysis of genetic diversity and inbreeding
- Identification of deleterious variants
- Estimation of demographic history
- Phylogenomic analysis

Each evening will feature a keynote-style open lecture by guest faculty on their seminal research advances and interpretations in conservation biology and genomics.

Course Sponsors



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PERSONNEL

ConGen Global organizers

Stephen J. O'Brien, Ph.D., Director; Professor, Nova Southeastern University, Ft. Lauderdale, Florida, USA

Eduardo Eizirik, Ph.D., Professor, Pontificia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil

Laurie Goodman, Ph.D., Publishing Director, GigaScience Press, Hong Kong, China

Cindy Harper, Ph.D., Director of the Veterinary Genetics Laboratory, Faculty of Veterinary Science, University of Pretoria at Onderstepoort, South Africa

Klaus-Peter Koepfli, Ph.D., Senior Research Scientist, Smithsonian-Mason School of Conservation, George Mason University, Front Royal, Virginia, USA

Laurie Marker, D.Phil., Founder, Executive Director, Cheetah Conservation Fund, Otjiwarongo, Namibia (**Local host**)

Taras Oleksyk, Ph.D., Assistant Professor, Oakland University, Rochester, Michigan, USA

Anne Schmidt-Küntzel, D.M.V., Ph.D., Director of Animal Health and Research, Cheetah Conservation Fund, Otjiwarongo, Namibia (**Local host**)

Emma Teeling, Ph.D., Associate Professor, University College Dublin, Ireland

Tutorial teaching faculty

Larissa Souza Arantes, Ph.D., Berlin Center for Genomics in Biodiversity Research, Berlin, Germany

Henrique Figueiró, Ph.D., Research Scientist, Vale Institute of Technology - Sustainable Development, Belém, Brazil

Lauren Hennelly, Ph.D., Center for Evolutionary Hologenomics, University of Copenhagen, Denmark

Guest lecturers

Agostinho Antunes, Ph.D., Professor, Interdisciplinary Center for Marine and Environmental Research (CIMAR), University of Porto, Porto, Portugal

Peter Dratch, Ph.D., Senior Biologist, U.S. Fish & Wildlife Service, Fort Collins, Colorado, USA

Carlos Driscoll, D.Phil., Galton Corp., Frederick, Maryland, USA

Julian Fennessy, Ph.D., Co-founder and Director of Conservation, Giraffe Conservation Foundation, Windhoek, Namibia

Abigail Guerier, M.Sc., Executive Manager, Rhino Conservation, Ongava Game Reserve, Namibia

Rainer Hassel, D.V.M., Head of Veterinary Academic Hospital, University of Namibia, Windhoek, Namibia

Yadvendradev Jhala, Ph.D., Dean (retired), Wildlife Institute of India, Dehradun, Uttarakhand, India

Harris Lewin, Ph.D., Research Professor, Global Futures Laboratory, Arizona State University, Tempe, Arizona, USA

Jose (Joe) Lopez, Ph.D., Professor, Nova Southeastern University, Ft. Lauderdale, Florida, USA

Shu-Jin Luo, Ph.D., Principal Investigator, School of Life Sciences, Peking University Beijing, China

Audrey Majeske, Ph.D., Professor, Oakland University, Rochester, Michigan, USA and University of Puerto Rico-Mayaguez, Mayaguez, Puerto Rico

Justin Merry, Ph.D., Associate Professor of Biology, Chair of Biology, Department of Biology, Saint Francis University, Loretto, Pennsylvania, USA

William Murphy, Ph.D., Professor, Texas A&M University, College Station, Texas, USA

Matti Nghikembua, Ph.D., Chief Ecologist and Forest Steward, Cheetah Conservation Fund, Otjiwarongo, Namibia

Alfred Roca, Ph.D., Professor, University of Illinois at Urbana-Champaign, Urbana-Champaign, Illinois, USA

DAILY SCHEDULE

Morning lectures, afternoon tutorials, and keynote evening lectures will be held in the CCF Lecture Hall

NOTE: All times are Central Africa Time (CAT) in Namibia

Sunday, January 5, 2025

- 12:00 – 6:00 pm Arrival and check-in: Pick up participants and faculty by shuttle from Hosea Kutako International Airport (WDH), Windhoek, Namibia
- 6:00 – 7:30 pm **DINNER**
- 7:30 – 9:30 pm **Introductions;** Lightning talks by students: 3-minutes + 2 slides per student

Monday, January 6, 2025

- 8:00 – 9:00 am **BREAKFAST**
- 9:00 – 9:15 am **Opening of CONGEN2025: Ms. Seimy Shidute**, Deputy Executive Director for Tourism Planning and Administration, Namibia
- 9:15 – 9:30 am **Welcome and overview:** Steve O’Brien & faculty
- 9:30 – 10:00 am **Walk-through of course topics:** Koepfli, Oleksyk, Schmidt-Küntzel
- 10:00 – 10:55 am **Lecture: Steve O’Brien** – “Perspectives of ConGen Global: Then and Now”
- 11:00 – 11:55 am **Lecture: Klaus Koepfli** – “Conservation Genomics: Next-Gen Sequencing & Study Design”
- 12:00 – 1:00 pm **LUNCH**
- 1:00 – 2:30 pm **Tutorial: Introduction to Unix and HPC** (Henrique Figueiró)
- 2:30 – 3:00 pm **BREAK**
- 3:00 – 4:30 pm **Tutorial: Next-generation sequencing data and quality control** (Henrique Figueiró)
- 4:30 – 5:00 pm **CCF Demo: Eveline Iikondja** – Scat dogs for cheetah detection
- 5:30 – 6:30 pm **DINNER**
- 7:30 – 8:30 pm **Keynote Evening Lecture**
Laurie Marker – “The Global Cheetah Conservation Program”

Tuesday, January 7, 2025

- 8:00 – 9:00 am **BREAKFAST**
- 9:00 – 9:55 am **Lecture: Anne Schmidt-Küntzel** – “A Brief History of Genetic Advances and Natural History of the Cheetah”

10:00 – 10:55 am	Lecture: Al Roca – “African Elephants and Their Natural History”
11:00 – 11:55 am	Lecture: Audrey Majeske – “Reef Royalty: Protecting the Royal Crown of the Reef”
12:00 – 1:00 pm	LUNCH
1:00 – 3:00 pm	Tutorial: Read mapping and variant calling 1 (Lauren Hennelly)
2:30 – 3:00 pm	BREAK
3:00 – 4:00 pm	Tutorial: Read mapping and variant calling 2 (Lauren Hennelly)
4:00 – 4:30 pm	Lecture: Henrique Figueiró – “Conservation Genomics in the Neotropics”
4:30 – 5:00 pm	CCF Demo: Calum O’Flaherty – Livestock Guarding Dogs
5:30 – 6:30 pm	DINNER
7:30 – 8:30 pm	<u>Keynote Evening Lecture</u> Cindy Harper – “DNA individualization Forensics of Rhinos of Southern Africa”

Wednesday, January 8, 2025

8:00 – 9:00 am	BREAKFAST
9:00 – 9:55 am	Lecture: Bill Murphy – “Why high-quality genomes matter for evolutionary studies: lessons from cats.”
10:00 – 10:55 am	Lecture: Anne Schmidt-Küntzel – “Non-invasive Genetics and Field Applications”
11:00 – 11:55 am	Lecture: Taras Oleksyk – “Parrots of The Caribbean”
12:00 – 1:00 pm	LUNCH
1:00 – 2:30 pm	Tutorial: Population structure 1 (Lauren Hennelly)
2:30 – 3:00 pm	BREAK
3:00 – 5:00 pm	Tutorial: Population structure 2 (Lauren Hennelly)
5:30 – 6:30 pm	DINNER
7:30 – 8:30 pm	<u>Keynote Evening Lecture</u> Bill Murphy – “The Natural History of the Mammalian Radiations”

Thursday, January 9, 2025

8:00 – 9:00 am	BREAKFAST
9:00 – 9:55 am	Lecture: Abigail Guerier – “Management of Black and White Rhinoceros Populations at the Ongava Game Reserve Using Complementary Genetic and Observational Monitoring Tools”

10:00 – 10:55 am	Lecture: Peter Dratch – “Policy for Sample/DNA Transport - Overview Then and Now”
11:00 – 11:55 am	Discussion of CITES restrictions – Peter Dratch and others
12:00 – 1:00 pm	LUNCH
1:00 – 2:30 pm	Tutorial: Genome-wide heterozygosity, SNV density, visualization 1 (Larissa Arantes)
2:30 – 3:00 pm	BREAK
3:00 – 5:00 pm	Tutorial: Genome-wide heterozygosity, SNV density, visualization 2 (Henrique Figueiró)
5:30 – 6:30 pm	DINNER
7:30 – 8:30 pm	<u>Keynote Evening Lecture</u> Julian Fennessy – “Saving giraffe: using science and management to conserve all four species across Africa”

Friday, January 10, 2025

8:00 – 9:00 am	BREAKFAST
9:00 am – 1:00 pm	FIELD DAY – Game drive CCF with bag lunch
4:30 – 9:00 pm	SUNDOWNER – Drinks and Dinner

Saturday, January 11, 2025

8:00 – 9:00 am	BREAKFAST
9:00—9:55 AM	Lecture: Stephen O’Brien – “Zoobiquity and Infectious Disease Outbreaks”
10:00 – 10:55 am	Lecture: Laurie Goodman – “How to Write a Scientific Manuscript and Appropriate Use of Generative AI”
11:00 – 11:55 am	Lecture: Justin Merry – “Undergraduate Education and Conservation Science”
12:00 – 1:00 pm	LUNCH
1:00 – 2:30 pm	Tutorial: Runs of homozygosity 1 (Larissa Arantes)
2:30 – 3:00 pm	BREAK
3:00 – 4:30 pm	Tutorial: Runs of homozygosity 2 (Larissa Arantes)
4:30 – 5:00 pm	Lecture: Larissa Souza Arantes – “From Sloths to Sea Turtles: Genomic Insights into Conservation Challenges and Evolutionary History”
5:30 – 6:30 pm	DINNER

7:30 – 8:30 pm **Keynote Evening Lecture**
Klaus Koepfli – “Decoding Survival: Comparative and Population Genomics Informs the Conservation of the Endangered Black-footed Ferret”

Sunday, January 12, 2025

8:00 – 9:00 am **BREAKFAST**

9:00 – 9:55 am: **Lecture: Laurie Goodman** – “A Guide to Publishing Ethics: From Mistakes to Misrepresentation to Fraud”

10:00 – 10:55 am **Lecture: Eduardo Eizirik** – “Evolutionary and Conservation Genomics of Neotropical Carnivores”

11:00 – 11:55 am **Lecture: Agostinho Antunes** – “Functional Genomics of Whole Genome Sequences”

12:00 – 1:00 pm **LUNCH**

1:00 – 2:30 pm **Tutorial: Deleterious variants 1 (Larissa Arantes)**

2:30 – 3:00 pm **BREAK**

3:00 – 4:30 pm **Tutorial: Deleterious variants 2 (Larissa Arantes)**

4:30 – 5:00 pm **Lecture: Lauren Hennelly** – “How genomics informs the conservation status and management of wolves in Asia”

5:30 – 6:30 pm **DINNER**

7:30 – 8:30 pm **Keynote Evening Lecture**
Harris Lewin – “The Earth BioGenome Project: An Enabler of the Coming Revolution in Conservation Genetics” (**via Zoom**)

Monday, January 13, 2025

8:00 – 9:00 am **BREAKFAST**

9:00 – 9:55 am **Lecture: Jhala Yadvendradev** – “The Cheetah Restoration Project”

10:00 – 10:55 am **Lecture: Carlos Driscoll** – “History of Domestications: The Lever That Founded All Civilizations”

11:00 – 11:55 am **Lecture: Jose Lopez** – “Global Invertebrate Genome Alliance - A Genomic Perspective for Marine Invertebrate Species”

12:00 – 1:00 pm **LUNCH**

1:00 – 2:30 pm **Tutorial: Demographic inference 1 (Henrique Figueiró)**

2:30 – 3:00 pm **BREAK**

3:00 – 5:00 pm	Tutorial: Demographic inference 2 (Henrique Figueiró)
5:30 – 6:30 pm	DINNER
7:30 – 8:30 pm	<u>Keynote Evening Lecture</u> Shu-Jin Luo – “The World’s Tiger Conservation Crisis: A Genomics Perspective”

Tuesday, January 14, 2025

8:00 – 9:00 am	BREAKFAST
9:00 – 9:55 am	Lecture: Rainer Hassel – “Rabies in Kudu Revisited”
10:00 – 10:55 am	Lecture: Matti Nghikembua – “Ecology of Southern African Cheetahs”
11:00 – 11:55 am	Wrap Up with ConGen Board: O’Brien, Eizirik, Koepfli, Marker, Oleksyk, Schmidt-Küntzel
12:00 – 1:00 pm	LUNCH
1:00 – 2:30 pm	Tutorial: Phylogenomic analysis 1 (Henrique Figueiró)
2:30 – 3:00 pm	BREAK
3:00 – 4:30 pm	Tutorial: Phylogenomic analysis 2 (Henrique Figueiró)
4:30 – 5:30 pm	Discussion: <i>Students ask questions about their own projects</i>
6:00 – 10:00 pm	DINNER and CLOSING PARTY

Wednesday, January 15, 2025

8:00 – 9:00 am	BREAKFAST
9:00 – 10:00 am	Group Discussion: Career paths - Faculty
10:00 – 11:00 am	Course evaluation and discussion- student comments
11:00 – 11:15 am	Group photo
11:15am – 12:00 pm	Check-out and departure: Shuttles depart CCF for Hosea Kutako International Airport (WDH), Windhoek, Namibia

SUGGESTED READINGS

Allendorf, F. W., Funk, W. C., Aitken, S. N., Byrne, M., & Luikart, G. (2022). *Conservation and the Genomics of Populations*, Third Edition. Oxford University Press, Oxford, United Kingdom, pp 750.

Bertorelle, G., Raffini, F., Bosse, M., Bortoluzzi, C., Iannucci, A., Trucchi, E., Morales, H. E., & van Oosterhout, C. (2022). Genetic load: genomic estimates and applications in non-model animals. *Nature Reviews Genetics* 23(8), 492–503. <https://doi.org/10.1038/s41576-022-00448-x>

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Díez-Del-Molino, D., Sánchez-Barreiro, F., Barnes, I., Gilbert, M. T. P., & Dalén, L. (2018). Quantifying temporal genomic erosion in endangered species. *Trends in Ecology & Evolution*, 33(3), 176–185. <https://doi.org/10.1016/j.tree.2017.12.002>

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Hoffman, J. I., Vendrami, D. L. J., Hench, K., Chen, R. S., Stoffel, M. A., Kardos, M., Amos, W., Kalinowski, J., Rickert, D., Köhrer, K., Wachtmeister, T., Goebel, M. E., Bonin, C. A., Gulland, F. M. D., & Dasmahapatra, K. K. (2024). Genomic and fitness consequences of a near-extinction event in the northern elephant seal. *Nature Ecology & Evolution*, 8(12), 2309–2324. <https://doi.org/10.1038/s41559-024-02533-2>

Kardos, M., Armstrong, E. E., Fitzpatrick, S. W., Hauser, S., Hedrick, P. W., Miller, J. M., Tallmon, D. A., & Funk, W. C. (2021). The crucial role of genome-wide genetic variation in conservation. *Proceedings of the National Academy of Sciences of the United States of America*, 118(48), e2104642118. <https://doi.org/10.1073/pnas.2104642118>

Kardos, M., Zhang, Y., Parsons, K. M., A, Y., Kang, H., Xu, X., Liu, X., Matkin, C. O., Zhang, P., Ward, E. J., Hanson, M. B., Emmons, C., Ford, M. J., Fan, G., & Li, S. (2023). Inbreeding depression explains killer whale population dynamics. *Nature Ecology & Evolution*, 7(5), 675–686. <https://doi.org/10.1038/s41559-023-01995-0>

Lou, R. N., Jacobs, A., Wilder, A. P., & Therkildsen, N. O. (2021). A beginner's guide to low-coverage whole genome sequencing for population genomics. *Molecular Ecology*, 30(23), 5966–5993. <https://doi.org/10.1111/mec.16077>.

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Theissinger, K., Fernandes, C., Formenti, G., Bista, I., Berg, P. R., Bleidorn, C., Bombarely, A., Crottini, A., Gallo, G. R., Godoy, J. A., Jentoft, S., Malukiewicz, J., Mouton, A., Oomen, R. A., Paez, S., Palsbøll, P. J., Pampoulie, C., Ruiz-López, M. J., Secomandi, S., Svardal, H., ... European Reference Genome Atlas Consortium (2023). How genomics can help biodiversity conservation. *Trends in Genetics* 39(7), 545–559. <https://doi.org/10.1016/j.tig.2023.01.005>