UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE CIÊNCIAS BIOLÓGICAS
DEPARTAMENTO DE ECOLOGIA E ZOOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ECOLOGIA

Course Syllabus

Code: ECO410064
Course Name: Conservation Genetics
Number of Credits: 2
Total Class Hours: 30

Instructors:

- Dr. Alexandre Almeida (1 credit)
- Prof. Dr. Selvino Neckel de Oliveira (1 credit) – **Course Coordinator**

Semester/Year: 01/2026
Period: In-person (June 29 - July 05, 2026)
Schedule: Monday to Friday, 10:00 AM–12:00 PM and 1:00 PM–5:00 PM
Available slots: 15
Classroom: To be confirmed

Office Hours: By appointment via email.

- Dr. Alexandre P. Almeida (alexandre.dealmeida@hotmail.com)

Prerequisites:
There are no prerequisites for this course.

Course Description:

Introduction:
History of Conservation Genetics. Fundamental concepts in population genetics and their relevance to ecology and conservation: population genetic structure, allele frequencies, Hardy-Weinberg equilibrium, and evolutionary forces (natural selection, genetic drift, gene flow, and mutation). Relationship between genetic diversity, adaptation, and population persistence in natural environments. How ecological processes (dispersal, habitat fragmentation, metapopulation dynamics) interact with genetic patterns. Neutral and adaptive genetic markers.

Genetic Diversity and Ecological Processes: Role of genetic variability in population and ecosystem resilience. Effects of inbreeding and inbreeding depression in small populations. Genetic Consequences of Population Bottlenecks and Founder Effects. Spatial population structure: isolation by distance, geographic barriers, and functional connectivity in natural landscapes. Applications of landscape genetics to understand dispersal and gene flow in threatened species.

Genetics Applied to Species Management and Conservation: Definition of Evolutionarily Significant Units (ESUs) and Management Units (MUs). Resolving taxonomic uncertainties and species delineation. Strategies to maintain genetic diversity in small and fragmented populations. Genetic

management of *in situ* and *ex situ* populations: ecological corridors, translocations, and population reinforcement. Genetic challenges in captive breeding and reintroduction programs. Emerging techniques (eDNA, metabarcoding, population genomics) and their applications in ecological monitoring. Climate genomics: identifying local adaptations and predicting evolutionary responses to environmental changes. Phenotypic plasticity and rapid responses to ecological disturbances. Evolutionary interactions in communities (e.g., host-pathogen coevolution) and implications for conservation.

Teaching Methodology:

Interactive lectures with audiovisual materials and scientific paper discussions. Some classes will include hands-on practice with specialized software related to the syllabus. Attendance is mandatory (minimum 75% requirement).

Assessment Criteria:

Evaluation will be based on participation in discussions (resulting from critical analyses of assigned scientific papers) and class engagement.

Schedule & Topics:

Date	Theoretical-Practical Content	Instructor(s)
29/06/2026	Introduction: History of conservation genetics and basic population genetics concepts	Alexandre
30/06/2026	Diversity and Population Dynamics: Molecular markers, genetic diversity, and evolution in natural populations	Alexandre
01/07/2026	Genetic Structure: Inbreeding, population structure, and viability	Alexandre

02/07/2026	Tools and Applications: Landscape genetics, phylogeography, and emerging techniques	Alexandre
03/07/2026	Management and Conservation: Taxonomic uncertainties, Management Units (ESUs/MUs), and applied genomics	Alexandre

References:

1. FRANKHAM, R.; BALLOU, J. D.; BRISCOE, D. A. Introduction to Conservation Genetics. 2nd ed. Cambridge University Press, 2010.
2. ALLENDORF, F. W.; LUIKART, G.; AITKEN, S. N. Conservation and the Genetics of Populations. 2nd ed. Wiley-Blackwell, 2013.
3. AVISE, J. C. Molecular Markers, Natural History and Evolution. 2nd ed. Sinauer Associates, 2004.
4. HEDRICK, P. W. Genetics of Populations. 4th ed. Jones & Bartlett Learning, 2011.
5. MANEL, S.; SCHWARTZ, M. K.; LUIKART, G.; TABERLET, P. Landscape Genetics: Concepts, Methods, Applications. Wiley, 2010.
6. WAITES, A. R.; SCHWARTZ, M. K.; LUIKART, G. Genomics and the Future of Conservation Genetics. Nature Reviews Genetics, 2018.
7. KARDOS, M.; ARMSTRONG, E. E.; FITZPATRICK, S. W. The Crucial Role of Genomics in Conservation. PNAS, 2021.
8. HAMMOND, R. L.; BRUFORD, M. W.; BOURKE, A. F. G. Genetic Structure and Conservation of Small Populations. Molecular Ecology, 2016.
(Revisão sobre desafios genéticos em populações pequenas e fragmentadas)
9. LOWE, A. J.; HARRIS, S. J.; ASHTON, P. Ecological Genetics: Design, Analysis, and Application. Wiley, 2004.
(Metodologias para integrar genética e ecologia em estudos de campo)
10. PALSTRÓM, B. et al. Environmental DNA for Biodiversity Research and Monitoring. Oxford University Press, 2022.
11. GALETTI, P. M. (Ed.) Conservation Genetics in the Neotropics. Springer, 2023. https://doi.org/10.1007/978-3-031-34854-9