



FEDERAL UNIVERSITY OF SANTA CATARINA
GRADUATE COURSE IN ECOLOGY

SYLLABUS



SEMESTER 02 / 2022

1. GENERAL INFORMATION

CODE	COURSE NAME	WORKLOAD - WEEK		WORKLOAD - SEMESTER
	Invasion ecology	12		60
	Number of students	Minimum: 4	Maximum: 20	N of credits: 4

2. SCHEDULE

September 30. Hours: 9-12 am

October 04, 07, 11, 14, 18, 21, 25. Hours: 9-12 am, 2-5 pm

3. PROFESSOR

Prof. Dr. Michele de Sá Dechoum

4. GRADUATE COURSE

Graduate course in Ecology, UFSC

5. COURSE OUTLINE

Theoretical background and conceptualization, historical biogeography and assisted migration of species. Propagule pressure. Invasiveness and invasibility. Impacts of invasive alien species. Pathways and vectors for the introduction and dissemination of invasive alien species. Public policies and strategies for the management of invasive alien species.

6. OBJECTIVES

To present and discuss: (1) concepts and the theoretical background of invasion ecology, (2) impacts of invasive alien species, (3) indirect and direct drivers related to the introduction and dissemination of invasive alien species, and (4) the potential application of ecological knowledge for the management of invasive alien species.

7. COURSE CONTENT

- Invasion ecology: theoretical background, historical biogeography and assisted migration of species.
- The invasion continuum (introduction – establishment – invasion).
- Hypotheses in invasion ecology.
- Key factors in invasion ecology.
- Propagule pressure.
- Species invasiveness.
- Habitat invasibility.
- Ecological, social, and economic impacts of invasive alien species.
- Pathways and vectors for the introduction and dissemination of invasive alien species.
- Biological invasions and the Anthropocene – direct and indirect drivers.
- Public policies and strategies for the management of invasive alien species.

8. DESCRIPTION OF METHODS

All activities will be in-person. Short classes will be taught by the professor in the mornings, which will be followed by discussions on articles. The afternoons will be dedicated to exercises in groups as well as to reading of scientific papers.

9. STUDENT ASSESSMENT

The final average will be composed of the following components: final seminar (50%), exercises in groups (25%) and, participation in class (25%).

10. COURSE PROGRAM

Date	Time	Topics
Aug 30	9-12 am	Course and participant presentation. Invasion ecology: concepts, historical biogeography and assisted migration of species. The invasion continuum (introduction – establishment – invasion). Discussion of potential topics for the final seminar
Sept 02	9-12 am	Pathways and vectors for introduction and dissemination of invasive alien species. National database on invasive alien species. Invasive alien species in Brazil
	2-5 pm	Exercise in groups + Reading of scientific papers. Class evaluation
Sept 06	9-12 am	Novel ecosystems. History of invasion science. Hypotheses in invasion science
	2-5 pm	Exercise in groups + Reading of scientific papers. Class evaluation
Sept 09	9-12 am	Key factors in invasion ecology. Propagule pressure. Species invasiveness. Habitat invasibility
	2-5 pm	Exercise in groups + Reading of scientific papers. Class evaluation
Sept 13	9-12 am	Ecological, social, and economic impacts of invasive alien species
	2-5 pm	Exercise in groups + Reading of scientific papers. Class evaluation
Sept 16	9-12 am	Management of invasive alien species. Adaptive management
	2-5 pm	Exercise – risk assessment. Class evaluation
Sept 20	9-12 am	Biological invasions and the Anthropocene – direct and indirect drivers. Challenges for the management: the human factor. Perspectives for the future
	2-5 pm	Exercise in groups + Reading of scientific papers. Class evaluation
Sept 23	9-12 am	Final seminar presentation
	2-5 pm	Final seminar presentation. Final course discussion. Course evaluation

11. REFERENCES

Scientific papers

- CATFORD, J., JANSSON, R., NILSSON, C. Reducing redundancy in invasion ecology by integrating hypotheses into a single theoretical framework. *Diversity and Distributions*, v. 15, p. 22-40, 2009
- DECHOUM, M. S.; SAMPAIO, A. B.; ZILLER, S. R.; ZENNI, R. D. 2018. Invasive species and the Global Strategy for Plant Conservation: how close has Brazil come to achieving Target 10? *Rodriguesia*, v. 69, p. 1567-1576
- EHRENFELD, J. G. Ecosystem consequences of biological invasions. *Annual Review of Ecology, Evolution and Systematics*, v. 41, p. 59–80, 2010
- ENDERS, M. et al. A conceptual map of invasion biology: Integrating hypotheses into a consensus network. *Global Ecology and Biogeography*, v. 29, p. 978-991, 2020
- ESSL F. et al. Which Taxa Are Alien? Criteria, Applications, and Uncertainties. *Bioscience*, v. 68, p. 496-509, 2018
- HULME, P. et al. Grasping at the routes of biological invasions: a framework for integrating pathways into policy. *Journal of Applied Ecology* V. 45, p. 403–414, 2008
- JESCHKE, J. M. General hypotheses in invasion ecology. *Diversity and Distributions*, v. 20, p. 1229-1234, 2014
- LEVINE, J. M. et al. Mechanisms underlying the impacts of exotic plant invasions. *Proceedings of the Royal Society B: Biological Sciences*, v. 270, p. 775–781, 2003
- LEVINE, J. D.; ALDER, P. B.; YELENIK, S. G. A meta-analysis of biotic resistance to exotic plant invasions. *Ecology Letters*, v. 7, p. 975-989, 2004
- LOCKWOOD, J. L.; CASSEY, P.; BLACKBURN, T. The role of propagule pressure in explaining species invasions. *Trends in Ecology and Evolution*, v. 20, p. 223-228, 2005
- LONSDALE, W. M. Global pattern of plant invasions and the concept of invasibility. *Ecology*, v. 80, n. 5, p. 1522-1536, 1999
- PYSEK, P. et al. A global assessment of invasive plant impacts on resident species, communities and ecosystems: the interaction of impact measures, invading species' traits and environment. *Global Change Biology*, v. 18, p. 1725–1737, 2012
- RICHARDSON, D. M.; PYSEK, P.; REJMÁNEK, M.; BARBOUR, F.; PANETTA, F. R.; WEST, C. J. Naturalization and invasion of alien plants: concepts and definitions. *Diversity and Distributions*, v. 6, p. 93-107, 2000
- SAKAI, A. K. et al. The Population Biology of Invasive Species. *Annual Review of Ecology, Evolution and Systematics*, v. 32, p. 305-332, 2001
- TRAVESET, A. & RICHARDSON, D. M. Mutualistic interactions and Biological Invasions. *Annual Review of Ecology, Evolution, and Systematics*, v. 45, p. 89-113, 2014
- SIMBERLOFF, D. The role of propagule pressure in biological invasions. *Annual Review of Ecology, Evolution and Systematics*, v. 40, p. 81–102, 2009
- ZALBA, S.M.; ZILLER, S.R. Manejo adaptativo de espécies exóticas invasoras: colocando a teoria em prática. *Natureza e Conservação*, v. 5, p. 16-22, 2007
- ZENNI, R.D.; ZILLER, S. R. An overview of invasive plants in Brazil. *Revista Brasileira de Botânica*, v. 34, n. 3, p. 431-446, 2011
- ZENNI, R. D.; DECHOUM, M. S.; ZILLER, S. R. Dez anos do informe brasileiro sobre espécies exóticas invasoras: avanços, lacunas e direções futuras. *Biotemas*, v. 29, p. 133-153, 2016

Books

- DAVIS, M. *Invasion biology*. Oxford University Press, 2009. 288p
- ELTON, C. *The Ecology of Invasions by Animals and Plants*. Springer, 1958. 181p
- HUI, C.; RICHARDSON, D. *Invasion dynamics*. Oxford University Press, 2017. 322p
- LOCKWOOD, J.L.; HOOPEES, M.; MARCHETTI, M. *Invasion ecology*. 2 ed. Wiley-Blackwell, 2013. 466p
- MYERS, J.H.; BAZELY, D.R. *Ecology and control of introduced plants*. Cambridge University Press, 2003. 313p
- RICHARDSON, D. *Fifty years of invasion ecology: the legacy of Charles Elton*. Wiley-Blackwell, 2011. 432p
- SIMBERLOFF, D.; REJMÁNEK, R. *Encyclopedia of Biological Invasions*. Berkeley e Los Angeles: University of California Press, 2011, 792p