



FEDERAL UNIVERSITY OF SANTA CATARINA  
GRADUATE COURSE IN ECOLOGY

SYLLABUS



SEMESTER 01 / 2021

**1. GENERAL INFORMATION**

CODE	COURSE NAME	WORKLOAD - WEEK		WORKLOAD - SEMESTER
	Invasion ecology			30
	Number of students	Minimum: 4	Maximum: 20	N of credits: 2

**2. SCHEDULE**

June 21-25, 2021; Hours: 9-12 am, 2-5pm

**3. PROFESSOR**

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

Synchronous activities will be developed in the mornings. These synchronous activities will include short classes/presentations by the professor, which will be followed by discussions in small groups. The afternoons will be dedicated to asynchronous activities and will include reading of scientific papers and the preparation of writing assignments.

## 9. STUDENT ASSESSMENT

Discussions in small groups (20%), participation in class (20%), and writing assignments (60%) based on reading of scientific papers.

## 10. COURSE PROGRAM

S: synchronous activity, A: asynchronous activity

Date	Time	S/A	Topics
June 21	9-12 am	S	Invasion ecology: theoretical background, historical biogeography and assisted migration of species. The invasion continuum (introduction – establishment – invasion). <b>Discussion in groups.</b>
	2-5 pm	A	Reading of scientific papers + preparation of writing assignment
June 22	9-12 am	S	Hypotheses in invasion ecology. Key factors in invasion ecology. Propagule pressure. <b>Discussion in groups.</b>
	2-5 pm	A	Reading of scientific papers + preparation of writing assignment
June 23	9-12 am	S	Species invasiveness. Habitat invasibility. <b>Discussion in groups.</b>
	2-5 pm	A	Reading of scientific papers + preparation of writing assignment
June 24	9-12 am	S	Ecological, social, and economic impacts of invasive alien species. Pathways and vectors for the introduction and dissemination of invasive alien species. <b>Discussion in groups.</b>
	2-5 pm	A	Reading of scientific papers + preparation of writing assignment
June 25	9-12 am	S	Biological invasions and the Anthropocene – direct and indirect drivers. Public policies and strategies for the management of invasive alien species.
	2-5 pm	A	Final discussion in groups. 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.; HOOPES, 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