

# Evolutionary Ecology

Fall 2023 – Level: Master 1 – Credits: 6 ECTS  
Code ENS: BIO-M1-S06-S1

## Course organizers

Dr. Jean-François Le Galliard ([galliard@bio.ens.psl.eu](mailto:galliard@bio.ens.psl.eu))

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## Program administration

Mrs. Anne Zalmanski ([anne.zalmanski@ens.psl.eu](mailto:anne.zalmanski@ens.psl.eu))

Class hours: 9-12 and 2-5 every Tuesday and Friday

Class primary location: ENS, 46 rue d'Ulm, 3<sup>th</sup> floor

Online course available on the Moodle (<https://moodle.bio.ens.psl.eu/>)

## What is evolutionary ecology?

In any given population, individuals' phenotypes vary; if this phenotypic variation is heritable, it may become the target of natural selection. The process and outcome of population-level phenotypic change driven by natural selection is *adaptation*. Phenotypic variation in traits that affect how individuals interact with one another and with their environment including other species may thus be shaped by natural and/or sexual selection. In return, the evolution of such traits may alter the structure, diversity, and function of the whole ecological system. Evolutionary ecology studies how natural and sexual selection shape phenotypic variation, and how the evolution of phenotypic traits feeds back on ecology.

## Course objectives

This is an intermediate-level course in evolutionary ecology. The course is designed to address the foundational themes of evolutionary ecology and provide adequate preparation for specialized, graduate-level courses. Topics covered in this class include: the origin of phenotypic variation, ecological causes of and constraints on natural selection, and the study of adaptation; evolution of life history traits, mating strategies and sex-related traits, social behavior (in human and non-human species); the ecology and evolution of interactions among species, evolution of symbiosis, and evolution of diseases and resistance.

## Prerequisites

Students are expected to be familiar with basic concepts and results of population ecology, community ecology and population genetics.

## Exam

Written analysis and oral presentation of a research article. The written analysis will be based on a reading template provided by the course organizer.

## Schedule – Fall 2023

See next page.

Ecole Normale Supérieure - PSL University  
International Master in Life Sciences - IMaLiS  
Ecology-Evolution Track

Date		Topic	Instructor	Online/Room
<b>Tuesday Oct 4</b>	9-12	1. The study of adaptation	Jean-François Le Galliard	Room 324
	2-5	2. Eco-evolutionary feedbacks	Régis Ferrière	Room 324
<b>Friday Oct 7</b>	9-12	3. Life history evolution	Régis Ferrière	Room 324
	2-5	10. Evolution of dispersal	Jean-François Le Galliard	Room 324
<b>Tuesday Oct 11</b>	9-12	5. Game theory and the study of animal behavior	Jean-Baptiste André	Room 324
	2-5	6. Cooperation and conflicts within the family	Jean-Baptiste André	Room 324
<b>Friday Oct 14</b>	9-12	7. Cooperation and conflicts outside the family	Jean-Baptiste André	Room 324
	2-5	8. Sexual selection	David Laloï	Room 324
<b>Tuesday Oct 18</b>	9-12	9. Coevolution of host-parasite interactions	Samuel Alizon	Room 324
	2-5	9b. Coevolution of host-parasite interactions	Samuel Alizon	Room 324
<b>Friday Oct 21</b>	9-12	11. Ecology and evolution of symbiosis	Marc-André Selsosse	Room 324
	2-5	11b. Ecology and evolution of symbiosis	Marc-André Selsosse	Room 324
<b>Tuesday Oct 25</b>	9-12	4. Evolution of lifespan and senescence	François Mallard	Room 324
	2-5	TD1. Evolutionary epidemiology (possible en visio)	Samuel Alizon	Room 324 ou en visio
<b>Friday Oct 28</b>	9-12	TD2. Adaptive radiations and evolutionary convergence	Jean-François Le Galliard	Room 324
	2-5	Evaluation: paper presentations	Jean-François Le Galliard	Room 324

### Textbooks and interesting references

Alizon S (2020) *Evolution, écologie et pandémie*. Ed. Points / Le Seuil.  
Danchin E, Giraldeau LA, Cézilly F (2008) *Behavioural Ecology*. Oxford University Press.  
Mayhew PJ (2006) *Discovering Evolutionary Ecology*. Oxford University Press.  
Roff DA (2001) *Life History Evolution*. Sinauer.  
Shuster SM, Wade MJ (2003) *Mating Systems and Strategies*. Princeton University Press.  
Selsosse MA (2000) *La Symbiose*. Vuibert.  
Thomas F, Lefevre T, Raymond M (2010) *Biologie Evolutive*. de Boeck Ed.