

# Evolutionary Ecology

Fall 2020 – Level: Master 1 – Credits: 6 ECTS  
Code ENS: BIO-M1-S06-S1

## Course organizers

Dr. Régis Ferrière ([ferriere@bio.ens.psl.eu](mailto:ferriere@bio.ens.psl.eu))

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

## Program administration

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

Class hours: 9-12 and 2-5.

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

First week: room 316

Second week: room 305

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 2020

See next page.

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

Date	Topic	Instructor	Online/Room
<b>Monday Nov 23</b>	9-12	1. The study of adaptation	Jean-François Le Galliard Online
	2-5	2. Life history evolution	Régis Ferrière Online
<b>Tuesday Nov 24</b>	9-12	3. Constraints	Tom Van Dooren Online
	2-5	4. Adaptive dynamics modeling	Régis Ferrière Online
<b>Wednesday Nov 25</b>	9-11:30	5. Optimization and eco-evolutionary feedbacks	Minus van Baalen Online
	2-5	6. Sexual selection	David Laloï Room 316
<b>Thursday Nov 26</b>	9-12	7. Ecology and evolution of dispersal	Jean-François Le Galliard Online
	2-5	6. Sexual selection	David Laloï Room 316
<b>Friday Nov 27</b>	9-12	8. Ecology and evolution of cooperation	Jean-François Le Galliard Online
	2-5	9. Evolution of human cooperation	Jean-Baptiste André Room 316
<b>Monday Nov 30</b>	9-12	9. Evolution of human cooperation	Jean-Baptiste André Room 305
	2-5	10. Ecology and evolution of symbiosis	Marc-André Selosse Room 305
<b>Tuesday Dec 1</b>	9-12	11. Coevolution of host-parasite interactions	Samuel Alizon Online
	2-5	11. Coevolution of host-parasite interactions	Samuel Alizon Online
<b>Wednesday Dec 2</b>	9-12	10. Ecology and evolution of symbiosis	Marc-André Selosse Room 305
	2-5	TD1. Evolutionary epidemiology	Samuel Alizon Online
<b>Thursday Dec 3</b>	9-12	TD2. Adaptive radiations and evolutionary convergence	Jean-François Le Galliard Room 305
	2-5	(No class.)	
<b>Friday Dec 4</b>	9-12	(No class.)	
	2-5	Exam	Jean-François Le Galliard & Régis Ferrière Room 305 / Online

### Textbooks and interesting references

Thomas F, Lefevre T, Raymond M (2010) *Biologie Evolutive*. de Boeck Ed.

Mayhew PJ (2006) *Discovering Evolutionary Ecology*. Oxford University Press.

Roff, DA (2001) *Life History Evolution*. Sinauer.

Danchin E, Giraldeau LA, Cézilly F (2008) *Behavioural Ecology*. Oxford University Press.

Shuster SM, Wade MJ (2003) *Mating Systems and Strategies*. Princeton University Press.

Selosse MA (2000) *La Symbiose*. Vuibert.

Stearns SC, Koella JC (2008) *Evolution in health and disease*. Oxford University Press.

Alizon S (2016) *C'est grave docteur Darwin ? L'évolution, les microbes et nous*. Ed. Le Seuil.