



## UNTIL DEATH DO US APART: LIVING IN A SYMBIOTIC WORLD

**Teachers:** Silvana Munzi (Univ. Lisboa), Cristina Cruz (Univ. Lisboa), Lourdes Morillas (Univ. Lisboa).

**NOTE:** this course can be done only with theoretical classes (option 1, 20h, online) or with both practical and theoretical classes (option 2, 36h, practical presential in mornings, theoretical afternoons online, as option 1)

**Calendar:** February 6<sup>th</sup>-10<sup>th</sup> 2023

**Schedule:** 14:00-18:30 (20h) (option 1); 9:30-18:30 (36h) (option 2)

**Option 1 – Participants can decide to attend only theoretical lessons**

**Location of theoretical lessons (evenings):** online

**Option 2 - Participants can decide to attend theoretical and practical lessons**

**Location of practical lessons (mornings):** Faculdade de Ciências da Universidade de Lisboa

**Location of theoretical lessons (evenings):** online

**Objectives:** Symbiosis is a key strategy for life on Earth. Nevertheless, although many research groups have long been committed to the study of symbiosis, its definition and functioning are not fully understood, and its ecological role and relevance are still underestimated.

Symbiotic associations vary from parasitism to mutualism and even simple persistent biological interactions, making the knowledge fragmented and focused on the details of single symbiotic systems. Knowledge of the various symbiotic relationships is rapidly increasing with the development of -omics tools, but without efforts to find common grounds. The concept itself of symbiosis can be faced by different points of view, spanning from biology to evolution, from philosophy to artificial intelligence.

In this course, we promote a multidisciplinary approach presenting the most recent findings on the topic and challenging the traditional way of considering symbiotic associations as exceptions and not as the rule.

**General plan:** Starting from the definition of symbiosis, we'll analyze the role of symbioses in evolutionary terms.

Plant-fungal-bacteria symbioses will be presented to illustrate ecological networks and ecosystem services. Examples of different symbiotic associations (lichens, biofilm, mycorrhizas) will be given by specialists in the field in theoretical-practical lessons taking in consideration morphological, physiological and ecological aspects. Part of the course will be devoted to the human microbiome and insect-bacteria symbioses and their consequences on/potentialities for human and environmental health. Philosophical aspects and challenges brought by the new discoveries in the area will be discussed. Potential applications in technology like evolutionary algorithms and industrial symbiosis will be considered as well as sociological aspects associated to agroecology. Practical lessons will allow participants to “put their hands” in some of the symbiotic systems presented in the course.

**This course can have a recognition of 3 ECTs (option 1) and 6 ECTs (option 2) for FCUL PhD students enrolling in it as part of their first doctoral year. These students need to deliver one report (option 1) or two reports (option 2) after the course. For students doing option 2 but only requiring 5 ECTs recognized in their specific PhD programmes the last 3.5 hours of the course are not mandatory, they need to deliver only the main report of option 2 and the certificate will be on 'Topics in Until Death do us apart: living in a Symbiotic World'. Such report(s) are also advised for other students requesting creditation of the course in their institutions. Details of the different reports for option 1 and option 2 will be given by the teachers during the course.**

**Nº (min, max) students:** 10 – 20

**Minimum formation:** Bachelor (“Licenciatura”) in Biology, Natural Science or related areas

**Directed to:** PhD or MSc students in Biology, Microbiology, Ecology, Environmental Studies or related areas, and postdocs and other professionals working in related topics

Fee: free for 1st year PhD students in Doctoral programmes at FCUL (e.g. Biologia), Biodiversity, Genetics and Evolution (BIODIV UL; UP), Biology and Ecology of Global Changes (BEAG UL, UA) and Sustainability Science (UL, several institutions), when the course counts credits for their formation, in which case the delivery of final report(s) done after the course is mandatory; the course is also free for more advanced PhD students of the BIODIV programme (ULisboa or UPorto); for other students fees vary whether option 1 or option 2 is chosen:

For other students:

**FEE (option 1):** 15 € for other PhD students from cE3c of other programmes besides BIODIV (free), 30 € for PhD students from institutions of the PEERS network (CFE); 55 € for FCUL Master students, more advanced PhD FCUL students and unemployed; 80 € for BTI, BI and other PhD students; 115 € for Professional and postdocs.

**FEE (option 2):** 50 € for more advanced PhD students of cE3c of other programmes besides BIODIV (free); 80 € for PhD students of the PEERS network (CFE); 125 € for FCUL Master students and unemployed; 180 € for BTI, BI and other PhD students; 250 € for Professional and postdocs.

When the maximum number of students is reached, 10 vacancies will be available for non-paying 1st year PhD students mentioned above, being, by order of preference students from: 1) cE3c; 2) BIODIV (not from cE3c); 3) FCUL (not from cE3c); 4) Sustainability Science (not from cE3c or FCUL); 5) BEAG (not from cE3c or FCUL).

**Deadline for applications:** January 13<sup>th</sup>, 2023

Candidates should send an e-mail to Silvana Munzi (ssmunzi@fc.ul.pt) with a short cv and motivation letter. The cv and letter should be named as *1st-lastNAME-CV.pdf* and *1st-lastNAME-ML.pdf* (that is personalize the name of each file with your first and last name).

**In the email please add the following information:**

**OPTION CHOSEN (1 or 2):**

Full Name:

E-mail:

Phone:

Professional activity: Professional/Postdoc, BTI, BI (or other non-post-doc research grant), PhD student (with/without scholarship), Lic. (Bachelor)/Master student

PhD student of the 1st year of a Doctoral programme at FCUL, BIODIV (FCUL/FCUP), or BEAG (FCUL or UA)?

If yes to the above question, PhD student doing the Course to count credits for 1st year?:

PhD student of cE3c or CEF (Centro de Ecologia Funcional)?:

Name of the PhD programme: