

**Title of the Training School:** Beginners course in ecological network analysis of multispecies interactions

The training school is organized in the framework of the COST Action FA1405 and it is jointly organized by the James Hutton Institute and the School of Agriculture, Polytechnic Institute of Bragança.

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**1. Description/Aims:** In recent years, the use of ecological network analysis has been an important contribution to the understanding of complex interspecies interactions in natural systems (e.g. food-webs, plant-pollinator, host-parasitoid interactions). In this beginners course, we provide an introduction to network theory and application in agroecosystems, in order to better predict and manipulate interactions between crops, arthropods and microorganisms (CAMos) to improve crop yields.

The short course will be mostly computer based using R. It will help participants to get to grips with basic coding for managing and converting data before exploring basic plotting techniques. It will then illustrate ways of describing the structure of networks and examine concepts such as nestedness, modularity and robustness. Throughout, the course will use real ecological data and discuss the importance of understanding and controlling for sampling issues. The course will draw on insights from both trainers, who are actively involved in network research in agroecosystems

Start Date: 30/10/2017 9:00

End Date: 01/11/2017 17:00

Number of trainees: 12

**2. Trainers**

Dr. Darren M. Evans, School of Natural and Environmental Sciences, Newcastle University, United Kingdom

Dr. Michael J. O. Pocock, Centre for Ecology & Hydrology, Wallingford, United Kingdom

**3. Audience**

This Training School is directed to MSc, PhD students and post-PhD researchers from Ecology, Biology, Agriculture, Biotechnology, Mathematical Modelling and others who

aim to acquire broad understanding of the conceptual description of ecological networks.

#### **4. Contents**

- i) Introduction to ecological networks
- ii) Getting started – data, metrics and plotting in R
- iii) Network descriptors
- iv) Nestedness and modularity
- v) Robustness
- vi) Species-level analysis
- vii) Advanced visualization (if time permits)

#### **5. Location**

The Training School will take place in the city of Bragança, located in the North Region of Portugal, and will be held at the Department of Biology and Biotechnology, at School of Agriculture (ESA) - Polytechnic Institute of Bragança (IPB).

Bragança is a welcoming historical city with numerous ancient buildings and museums, where mountains and forests combine to create an attractive natural environment for students and staff. The best attractions include the Montezinho Natural Park, the Citadel, the 12th-century Domus Municipalis, the Cathedral and the centre of the city ([https://portugalvirtual.pt/\\_tourism/costaverde/braganca/ukcity.html](https://portugalvirtual.pt/_tourism/costaverde/braganca/ukcity.html)).

#### **How to get there?**

##### **By Plane**

The Francisco Sá Carneiro in Porto (OPO) airport is the nearest International airport.

Other possibilities are Lisbon Airport (LIS), and Spanish airports, namely Barajas in Madrid (MAD).

##### **From Oporto**

From the airport to the centre of Oporto: In the metro station (lower level) buy a Z4 type ticket (it costs a little more than 2€). Then go up to the platform where the trains leave with direction to "Estádio do Dragão". The name of the stop where you should leave the vehicle is "Bolhão" and the trip lasts 30 to 45 minutes.

From the centre of Oporto to Bragança: There are daily bus connections from Oporto and other major cities (including Lisbon) to Bragança. The following bus companies travel to and from Bragança:

- Rede eXpressos (on line ticketing available at <http://www.rede-expressos.pt/default.aspx>)
- RodoNorte (online schedules and fares at <http://www.rondonorte.pt/pt/>)



Fig. 1 – Oporto map indicating the location of the central bus stations.

### In Bragança

Buses make two stops in Bragança: the IPB bus stop and the central bus station.

### **6. Accommodation**

Participants may opt for several accommodation options such as:

*Pousada de Juventude* (Youth Hostel), located 1.6 km away from the ESA  
 Double room w/ private bathroom: €25.60 per person per night  
 Family room 4 single beds w/ private bathroom: €10.80 per person per night  
<http://www.pousadasjuventude.pt/pt/pousadas/braganca/>

*Hotel São Lázaro* (approx. €50 per night), located 3.1 km away from the ESA  
<http://www.hotelsaolazaro.com>

*Hotel Ibis Bragança* (approx. €40 per night), located 3 km away from the ESA  
<http://www.ibis.com/pt/hotel-3338-ibis-braganca/index.shtml>

*Hotel Tulipa* (approx. €35 per night), located 2.4 km away from the ESA  
<http://www.tulipaturismo.com/>

*Hotel Classis* (approx. €35 per night), located 2.4 km away from the ESA  
<http://www.hotelclassis.com/>

*Hotel Santa Apolónia* (approx. €35 per night), located 0.8 km away from the ESA  
<http://hotelsantaapolonia.pt>

*Pousada São Bartolomeu* (approx. €100 per night), located 1.3 km away from the ESA  
<http://www.pestana.com/pt/hotel/pousada-braganca>

### **7. Application**

Participants must apply by sending a short CV and motivation letter to Paula Baptista (pbaptista@ipb.pt).

Application deadline: 16/10/2017.

Applicants need to bring their own laptop computer, with R installed prior to the course starting.