An introduction to Ecological networks - Syllabus

Instructor:
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Class period:
Mon 11th: 2pm-5pm
Tuesday 12th-Friday 15th: 9am-12pm and 2pm-5pm

Course description:
This course is an introduction to the study of ecological networks. Basic concepts of graph theory used in the study of ecological networks, as well as arguments in favor and against this approach will be discussed. The course will also tackle the drivers of ecological network patterns and species-level information that can be obtained from interaction networks. The objective is to provide students with the basic network tools to study ecological interactions and think critically about the use of this approach in different contexts.

Course format:
This course will be delivered in-person. The course will consist of a mixture of lectures and practical assignments. Students will usually need to complete readings before class. Students can expect to work both individually and in small groups every class, and should come prepared with a computer to develop the practical sections of the course. Students should consider working through the practice questions which will be included at the end of each lecture. Completing these practice questions will be one of the most effective ways of preparing for the final assessment.

Course objectives
The objective of this course is to introduce students to the study of ecological networks. By the end of this course students will be able to identify the different types of ecological networks, ways to represent networks and metrics used to define network patterns and species roles. Students will also develop scientific research skills in the context of a network study, including developing hypotheses, designing a study and communicating results.

Course grading scheme:
Practical assignments: 30%
Final assessment: 70%

Practical assignments:
Practical assignments will consist of developing basic scripts in R to graphically represent interaction networks and obtain different network metrics.

Final assessment:
The final assessment will take place on the last course day. Students will have the option to develop the assessment individually or in groups. When developing the assessment in groups, students must aim to contribute substantially, putting in the same effort as all group members to the project. The assessment will consist of:
- Establishing two ecological questions that can be answered using a network approach, including hypotheses and predictions.
- Describe the type of interaction network needed.

- Description of the experimental design (study system, how to sample interactions and other variables that would be used in the analyses, replicates, etc).
- List the network metrics to be used in the analyses, what is their ecological meaning in the specific study case, function and package available to calculate them.
- Define the statistical analyses that need to be conducted to answer the initial questions. Clearly state the response and predictor variables. Present schematic figures of the expected results.
- Oral presentation of the project. Answer questions from the instructor and peers.

Readings:
Students should read the material indicated before the course. A list of the papers students need to read for each day will be distributed two weeks before the course.

Useful reference for R:
Crawley, M.J. (2013) The R Book. Second Edition. John Wiley & Sons Ltd. Chichester, West Sussex, UK.

Expected schedule (subject to change):

Day	Time	Lecture/Practical topics
Monday 11th	2pm-5pm	Intro to the course
Tuesday 12th	9am-12pm	Ecological networks, pros and cons of using a network approach in ecology
	2pm-5pm	Network structure (community level metrics)
Wednesday 13th	9am-12pm	Species-level metrics derived from networks
	2pm-5pm	Indirect interactions. Relationship between Ecological networks and ecosystem functions
Thursday 14th	9am-12pm	Drivers of network structure
	2pm-5pm	Application of graph theory in other fields
Friday 15th	9am-12pm	Final assessment
	2pm-5pm	Final assessment oral presentations