**Biodiversity information systems: use and analysis of primary biodiversity data (1.5 ECTS)**

**Prerequisites**

The course is aimed at advanced and postgrad students on biological sciences and related subjects including nature conservation, wildlife management, and management of natural resources or public health. Basic knowledge on GIS is required. Basic knowledge of R and statistical regression models is preferable.

Students will be requested to bring along a dataset (not extensive) or a question they are working on to be analysed during the course, and a computer.

**Objectives, including learning outcomes**

The course is aimed to introduce students to biodiversity information systems, its history, and inherent features and potential applications of primary biodiversity data. Specific goals of the course are:

1) To train students in the use of different digital techniques for monitoring and collection of species observations
2) To train students in the quality requirements and tools available for reporting (uploading) observations to open access web-based databases
3) To instruct students into the use of web-portals (e.g. Analysisportal.se, GBIF.org, ALA.org.au, Bioatlas.se) to get access to publicly available primary biodiversity data.
4) To expose the students to standard criteria and techniques to incorporate the data’s inherent error and bias into statistical analyses.

**Learning Outcomes**: after this course the student should be able to:

- Critically compare sources of biological information in terms of inherent bias and error
- Analyse the bias present in different dataset obtained from biodiversity databases.
- Criticise and judge conclusions taken with presence-only data based on the statistical approach used and the scientific question.
- Use already made digital forms to take biological data in field and upload it to global repositories.
- Download biological data from databases that is relevant to a scientific question.

**Content**
The course will cover theoretical and practical aspects about the digitalization and use of biological observation records available in biodiversity information systems.

History of data infrastructures for biological observations: from amateur societies to national programs. Historical and cultural reasons that promoted social interest. Sources of presence-only data. Digital infrastructures and portals to store and collect biological observations. DarwinCore data standard. Digital collection of biological observations. Non-systematic initiatives for data collections (Citizen Science programs). Treatment of error and bias in non-systematic (opportunistic) biological data: data-filtering protocols and ignorance maps. Statistical analysis of presence-only data: biodiversity indices, and models acknowledging spatial and temporal variability. Estimation of sampling effort and detection probability.

**Pedagogical form** The course is based on lectures, workshops and student’s discussions. Workshops will require reading of scientific literature and hands-on exercises.

**Requirements for examination**

The student should actively participate in all activities planned for the course. The evaluation will be based upon the presentation of the study case proposed by the student where she/he should apply the content learned during the course. This task could be prepared in groups of up to two people.

**Time table**

Day 1: Morning: (Lecture) History of data infrastructures for biological observations: from amateur societies to national programs. Historical and cultural reasons that promoted social interest. Sources of presence-only data. Digital infrastructures and portals to store and collect biological observations.

Afternoon: (Workshop) exploration of different open-access biodiversity databases.

Day 2: Morning: (Lecture) Digital collection of biological observations. Non-systematic initiatives for data collections (Citizen Science programs): applications and use on applied ecology.

Afternoon: (Workshop) Use of digital tools for collecting, storing and archiving systematic and non-systematic field observations.

Day 3: Morning: (Lecture) Analysis and treatment of error and bias in non-systematic (opportunistic) biological data: data-filtering protocols versus ignorance maps and modelling of bias.

Afternoon: (Workshop) study case analysis and preparation of final work. Reading literature for next morning.
Syllabus PhD-course

Day 4: Morning: (Literature seminar and Lecture) Statistical analysis of presence-only data: biodiversity indices, and models acknowledging spatial and temporal variability. How to estimate sampling effort and detection probability.

Afternoon: (Workshop) Data analysis proposals for study case and preparation of final work.

Day 5: Oral presentation and evaluation of study cases.

Additional information

**Number of students:** min 6, max: 20

**Organizer:** Dr. Alejandro Ruete (Greensway AB)