COURSE DETAILS

"ECOSYSTEM SERVICES AND ENVIRONMENTAL DAMAGE ASSESSMENT MODULE"

DEGREE PROGRAMME: **Forestry and Environmental Sciences**

ACADEMIC YEAR: **2021-2022**

GENERAL INFORMATION – TEACHER REFERENCES

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GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE (IF APPLICABLE): **Ecological Data Analysis**

MODULE (IF APPLICABLE): **Quantitative Ecology Lab**

CHANNEL (IF APPLICABLE):
https://teams.microsoft.com/l/team/19%3ae15d93c4ceb94f1bb600fecf64f390c5%40thread.tacv2/conversations?groupId=2f5ca2e7-d4eb-4535-82c8-bd90920c0e37&tenantId=2fcfe26a-bb62-46b0-b1e3-28f9da0c45fd

YEAR OF THE DEGREE PROGRAMME (I, II, III): **I**

SEMESTER (I, II): **I**

CFU: **6**

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "ORDINAMENTO")

None

PREREQUISITES (IF APPLICABLE)

Basic notions about the use of spreadsheets (e.g. Microsoft Office Excel).

LEARNING GOALS

The course aims to provide specific knowledge about ecosystem services (SE) classification systems and on the most appropriate methods for their correct evaluation, particularly the CICES methodology of the European Environment Agency (EEA). The applications will focus on the SEs supplied by the forests and trees of natural and urban environments. The quantitative evaluations will be carried out through the above- and below-ground biomass estimation methods, using species-specific allometric equations. Applications to real case studies of forest contests constitute a qualifying part of the degree program and the professional profile of graduates in Forestry and Environmental Sciences.
The course will provide the students tools and experience in producing and evaluating technical reports and scientific results, with a focus on reporting and interpreting statistical aspects. Students should thus become confident in designing and selecting sampling methodologies, choosing and applying statistical techniques. All students will be solicited to suggest alternative and innovative approaches in resolving statistical problems and in evaluating the obtained results.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

Knowledge and understanding of ecosystem services (SE) provided by forest systems, agroecosystems and urban forests represent a prerequisite for planning and appropriately managing the natural resources. The student will demonstrate that he can categorize and describe the SEs to measure, map, and evaluate them correctly. In other words, the student will need to show that he can classify and quantitatively estimate the ES provided by forest ecosystems and, in the case of disturbances or improper management, demonstrate that they can quantify both the loss of ES and the environmental damage.
Students have to demonstrate to I) master opportunities and challenges of data analysis in ecology; II) know the main families of statistical tests; III) evaluate methods and results from others' works, highlighting strong-points and weaknesses. The course will provide the students the theoretical background to build and select a sampling design and proper statistical analyses, as well as practical exercises to apply such knowledge. The course will thus strongly follow a "hands-on" approach, with exercises taking place in the informatics lab.

Applying knowledge and understanding

The student needs to show ability to apply the knowledge acquired during the course to real cases presented during practical exercises in the forests (Urban Park, protected areas, and Southern Apennine Forests). The field exercises and the preparation of technical reports allow the student to manipulate and interpret the quantitative data relating to the measured SEs and correctly read and analyze the data reported in the technical and scientific reference literature. The teaching aims to transfer the skills and methodological approaches practical to allow the student to independently proceed to SE estimates of forest for planning and management purposes and assess environmental

damage following the detriment of ESs. Writing technical reports allows the student to structure the survey carried out in the forest in an organized way and prepare and present the report using technical and scientific language, according to the purpose of the work (forest planning, carbon stock estimation, biomass estimation, Etc.).
Students will show the ability to properly select for sampling designs, methods and statistical tests according to the ecological question and data structure provided. The course will provide students with tools and know-hows to produce and evaluate scientific and technical reports, being also solicited to suggest alternative and innovative approaches.

COURSE CONTENT/SYLLABUS

Quantitative Ecology Lab (6 CFU)

1. Definitions and descriptive statistics
2. Comparison and relationship tests
3. Choosing the appropriate test
4. Sampling methods and design
5. Variables and distributions
6. Illustrating statistical results
7. Examples and exercises: from sampling design to result interpretation

READINGS/BIBLIOGRAPHY

Books, reports and scientific papers
(Quantitative Ecology Lab)

Dytham, C. (2011). *Choosing and using statistics: a biologist's guide*. John Wiley & Sons.

Fowler J. & Cohen L. (2010). Statistica per ornitologi e naturalisti. Franco Muzzio Ed.

Whitlock M. C. & schluter D. (2010). Analisi statistica dei dati biologici. Zanichelli

TEACHING METHODS

The teacher of the Quantitative Ecology Lab module will use: a) lectures for about 50% of the total hours available, b) practical exercises in the laboratory and the field for in-depth analysis and applications to concrete cases of theoretical aspects for 25% of total hours, and c) 5% will be dedicated to seminars held by researchers.

EXAMINATION/EVALUATION CRITERIA

The final evaluation consists of two tests: i) a final oral exam and ii) a single written intermediate exam.

i) The final exam aims to verify the learning outcomes through an oral interview. The student must demonstrate that they acquired the ability to present the topics with completeness and relevance. The subject of the oral exam will consist in at least three of the topics covered during the lessons. The minimum duration of the oral interview is 20 minutes up to a maximum of 40 minutes.
ii) The single exam will consist in the performance of a written multiple-choice and open-answer test, supplemented by numerical calculation exercises. It will be temporally placed in the

middle of the course and will last 1 hour. The test will focus on the topics covered during the course that require numerical quantification elements to verify the students' ability to manipulate and interpret data and processing results.

Similar weight is attributed to each of the two tests, oral final and written intermediate, which make up the final judgment.

a) Exam type:

Exam type	
written and oral	X
only written	
only oral	
project discussion	
other	

In case of a written exam, questions refer to: (*)	**Multiple choice answers**	X
	Open answers	X
	Numerical exercises	X

(*) multiple options are possible