

Code: ECO410023

Course: Meta-analysis

Credits: 02

Total: 30 h

Professors:

Dr. Bruno Renaly Souza Figueiredo

Dr. André Andrian Padial (UFPR)

Semester/Year: 2022-2

Period: 14/11/2022 to 18/11/2022 (days 14, 16, 17, and 18/11). On November 14, the class will be from 9:00 to 12:00 and from 14:00 to 16:00.

Hours: 09:00 to 12:00 and 14:00 to 18:00.

Number of students: 20

Room: To be confirmed

Office hours: Professor's room from 13:00 to 14:00, during the course.

Pre-requisite: Basic statistic

Syllabus:

1. Introduction to meta-analysis procedures: What is it and how to do a meta-analysis?; 2. Estimating effect size; 3. Combining results from independent studies: fixed and random effects; 4. Studying heterogeneity, structured meta-analysis and meta-regression, 5. Problems and criticisms; 6. Applying meta-analytical procedures in ecology; 7. Using the R/Excel program.

Methodology:

The content will be covered through 8 (eight) theoretical classes and directed exercises on the computer. The classes will be given through dialogical presentations with the aid of audiovisual material. The directed exercises will be performed in the free R programming environment, providing guidance on the basics of programming in this language. Multiple databases and tutorials for analyzing them will be made available. Bibliographic material will be passed around for daily reading along with exercises with problems to be solved during the course. At the end of the course the students will have to present a project describing a possible application of meta-analysis methods in ecology studies.

Assessment of students' performance:

The evaluation will be made continuously by the observation and participation of students, resolution of exercises in class and in a guided manner. In addition, a project describing a possible application of meta-analysis methods in ecology studies will be used as an evaluative instrument of the teaching-learning process. The basic structure of this project should contain: (i) a brief introduction with the objectives and the questions in ecology that would be evaluated with meta-analysis procedures; (ii) a description of the methods of data collection and meta-analysis that would be used; (iii) a hypothetical presentation of the possible results and a discussion of the implications considering the questions elaborated.

Program and Schedule:

Day	Time	Professor	Content
14/11	09:00 - 12:00	Bruno	Presentation of the course and types of syntheses: Qualitative and quantitative reviews coupled or not with systematic protocols.
14/11	14:00 - 16:00	Bruno	Effect sizes: Estimation of effect size.
16/11	09:00 - 12:00	Bruno	Effect Sizes: Conversion between effect sizes.
16/11	14:00 - 18:00	Bruno	Inference on meta-analytic models: fixed effects models and random effects models.
17/11	09:00 - 12:00	Bruno	Inference on meta-analytic models: heterogeneity; subgroup analysis; meta-regression.
17/11	14:00 - 18:00	Bruno	Inference on meta-analytic models: dependency; publication biases.
18/11	09:00 - 12:00	Bruno	Problems and criticisms of meta-analysis; Application of meta-analytical procedures in ecology
18/11	14:00 - 18:00	Bruno	Presentation of projects based on a meta-analysis

References:

- Borenstein, M., Hedges, L.V., Higgins, J.P.T., Rothstein, H.R. 2009. Introduction to meta-analysis. Chichester: John Wiley & Sons, 421 p.
- Collaboration for Environmental Evidence. 2018. Guidelines and standards for evidence synthesis in environmental management. Version 5.0 (Pullin, A.S., Frampton, G.K., Livoreil, B., Petrokofsky, G. Eds). Disponível em: <<http://www.environmentalevidence.org/information-for-authors>>. Acessado em: 08/09/2021.
- Foo, Y. Z., O'Dea, R. E., Koricheva, J., Nakagawa, S., Lagisz, M. 2021. A practical guide to question formation, systematic searching and study screening for literature reviews in ecology and evolution. *Methods in Ecology and Evolution*, 12: 1705-1720.
- Gurevitch, J., Koricheva, J., Nakagawa, S., Gavin, S. 2018. Meta-analysis and the science of research synthesis. *Nature*, 555: 175-182.
- Koricheva, J., Gurevitch, J., Mengersen, K. 2011. Handbook of meta-analysis in ecology and evolution. Princeton: Princeton University Press, 498 p.
- López-López, J.A., Page, M.J., Lipsey, M.W., Higgins, J.P.T. 2018. Dealing with effect size multiplicity in systematic reviews and meta-analyses. *Research Synthesis Methods*, 9: 336-351.
- Lortie, C.J. 2014. Formalized synthesis opportunities for ecology: systematic reviews and meta-analyses. *Oikos*, 123: 897-902.
- Moher, D., Liberati, A., Tetzlaff J., Altman, D.G., The Prisma Group. 2009. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6: e1000097.
- Viechtbauer, W. 2010. Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36: 1-48.