Meta-analysis in Biology and Environmental Sciences, 5 ETC

Course period: 21-26 Aug 2016 Course location: SLC Tjärnö	Last day for application: 2016-07-31

Course leader / Address for applications:

Gunilla Toth / gunilla.toth@marine.gu.se

Course description (Advertisement for Ph.D. students):

Meta-analysis is the statistical synthesis of the results of different research studies. These tools and the conceptual framework in which they are based provide a widely implemented, cross-disciplinary statistical framework for quantifying, pooling, and evaluating the results of different studies on the same topic. In this course, students will learn how to conduct a meta-analysis from start to finish. We will also discuss some common mistakes as well as controversies regarding the implementation of meta-analysis in the biological and environmental sciences.

The course starts with individual preparatory literature studies that will be examined through two literature seminars in the first half of August. Students will have an opportunity to join the seminars at a distance or to hand in written summaries. The main part of the course will be taught full-time during one obligatory week at the Sven Lovén Centre for Marine Sciences at Tjärnö (SLC) outside Strömstad, August 21-26 2016. Each day during the course will include both theoretical lectures and extensive hands-on experience with practical assignments and group projects. Tjärnö is situated approximately 160 km north of Gothenburg and 130 km south of Oslo. More information about the research station is found at http://loven.gu.se/english/stations/tjarno

The on-site course, including a study trip by boat, accommodation and meals, is free of charge but students will need to cover their own travel costs.

The course is recommended to correspond to 5 ECTS, (5 HP) in total, including the preparatory literature study at a distance and one week of intense studies, on site, at SLC Tjärnö.

Application and contact: Send a mail including a short (0.5 A4) description of your research and time left to PhD-defense to Gunilla Toth (gunilla.toth@marine.gu.se). Deadline July 31, 2016

Responsible department and other participation departments/organizations:
Dept of Marine Sciences, University of Gothenburg; Dept of Ecology and Evolution, Stony Brook University, USA; School of Biology, University of London, UK

Teachers:
Assoc. Prof. Gunilla Toth (course leader and main contact)
Prof. Jessica Gurevitch
Prof. Julia Koricheva

Examiner: Prof. Per Jonsson

Meta-analysis in Biology and Environmental Sciences, 5 hp

Third cycle education

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1. Confirmation
The syllabus was confirmed by the Head of the Department of Marine Sciences, 2016-03-16.

Disciplinary domain: Science
Department in charge: Department of Marine Sciences
Main field of study: Biology and Environmental Sciences

2. Position in the educational system
Elective course; third-cycle education.

3. Entry requirements
Admitted to third cycle education.

4. Course content
Meta-analysis is the statistical synthesis of the results of different research studies. These tools and the conceptual framework in which they are based provide a widely implemented, cross-disciplinary statistical framework for quantifying, pooling, and evaluating the results of different studies on the same topic. Meta-analysis is firmly established in medical and social sciences research, and has become an important statistical approach in the fields of ecology, evolution and environmental sciences in recent decades. This course will cover the framework of meta-analysis specifically as it is being used in the biological and environmental sciences. Students will learn how to conduct a meta-analysis from start to finish, including formulating hypotheses, extracting data from primary literature, computing effect sizes, testing for the effects of covariates (moderators or explanatory variables), examining assumptions and sources of bias, and presenting the results. We will also discuss some common mistakes as well as controversies regarding the implementation of meta-analysis in the biological and environmental sciences.

5. Outcomes
After completion of the course the Ph.D. student is expected to be able to:

1. Knowledge and understanding
- Define meta-analysis and describe its role in the research process
- Demonstrate how to assess and interpret variation in effect size across studies

2. Skills and abilities
- List and perform the different steps included in a meta-analysis
- Compute effect sizes and treatment effects
- Compare fixed- and random effect models for synthesizing data

3. Judgment and approach
- Explain how to avoid common mistakes in meta-analysis
- Identify controversies in meta-analysis

6. Required reading
Koricheva J, Gurevitch J, Mengersen K (2013) Handbook of Meta-Analysis in Ecology and Evolution. Princeton University Press. (Selected chapters)
Scientific papers assigned during the course

7. Assessment
Students must actively participate in seminars, lectures, practical assignments and oral presentations. Examination will be in the form of oral presentations individually or in a group.

A Ph.D. student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Department.

The number of examinations is to be limited to five occasions and the number of placements is to be limited to two occasions.

In cases where a course has been discontinued or major changes have been made a Ph.D. should be guaranteed at least three examination occasions (including the ordinary examination occasion) during a time of at least one year from the last time the course was given.

8. Grading scale
The grading scale comprises Fail, (U), Pass (G)

9. Course Evaluation
The course evaluation is carried out together with the Ph.D. students at the end of the course, and is followed by an individual, anonymous survey. The results and possible

changes in the course will be shared with the students who participated in the evaluation and to those who are beginning the course.

10. Language of instruction
The language of instruction is English.