GÖTEBORGS UNIVERSITET

Life and Earth History, 1.5 hp

Course period:	Last day for application:
2016-09-05 – 2016-09-09	2016-08-15

Course leaders / Address for applications:

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

The evolution of life on Earth is inevitably linked with the geologic and climatic history that have dramatically changed available habitats and resources over time. In this course we will explore how geologic and paleoclimatic evidence and paleontological and neontological data can be combined to better understand the interplay between Earth history and the evolution and biogeography of organisms. We will provide key concepts about biostratigraphy and fossil preservation and their crucial role in dating events in deep time. We will touch upon several major events of climate changes and landmass dynamics in different part of the world and at different geological times, such as the formation of the Himalayan mountain range, the Paleocene–Eocene Thermal Maximum (PETM; ~ 55 Ma), and the formation of a land bridge connecting the North and South American continents. A special focus will be given to the effects of these events on local and global biodiversity and its spatial distribution. Further, we will demonstrate computational methods that can help us investigating the dynamics of origination, dispersal, and extinction of organisms using fossil occurrence data. This course will also include practicals providing training in computational (paleo)biology to infer macroevolutionary dynamics and instill or reinforce skills in python and R computing.

Responsible department and other participation departments/organisations:
B. Oxelman

Teachers:
C. D. Bacon, C. Hoorn, C. Jaramillo, D. Silvestro

Examiners:
C. D. Bacon, D. Silvestro

GÖTEBORGS UNIVERSITET

Faculty of Science; Department of Biological and Environmental Sciences

Life and Earth History, 1.5 hp
Third cycle education

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1. Confirmation
The syllabus was confirmed by the Head of the Department of Biological and Environmental Sciences, Lars Förlin, 2015-12-DD.

Disciplinary domain: Science
Department in charge: Department of Biological 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
The course includes: 1) formal lectures on earth history and its links to biodiversity dynamics; 2) workshops on the use of computational methods to infer macroevolutionary processes from fossil data with hands-on practicals; 3) visit the "The history of life and its teeming diversity" exhibition at the Natural History Museum of Gothenburg.

5. Outcomes
After completion of the course the Ph.D. student will have gained insights on important geological and climatic events that have characterized Earth history and inevitably impacted biodiversity and evolution. They will also have a better understanding of the paleontological and geological evidence that these events left and how they can be used to understand the origin and history of life on Earth, at different geographic and temporal scales. Finally, participants will learn how to setup and carry out macroevolutionary analyses using the software PyRate (https://github.com/dsilvestro/PyRate) to infer origination, extinction and preservation rates from fossil occurrence data.

A. Knowledge and understanding

- Explicit knowledge on the geological time scale and major events in the physical sciences that are related to biodiversity.
- The shortcomings and power related to the use of the fossil record.
- How physical and biological sciences can be integrated to reach broader and more accurate conclusions.
- What kinds of topics are at the cutting edge of integrated science?

B. Skills and abilities

- Skills in python or other computing in the terminal is an advantage, but not a requirement and the student will finish the course with greater familiarity in these skills, as well as specific knowledge of PyRate.
- Critical thinking skills and interdisciplinary abilities will likely be improved through this course.

C. Judgement and approach

- The final grade will be based on course participation and interaction in discussion, as well as the research proposal and presentation at the end of the course. Students can use their ideas and proposal for future projects and grant applications, or as a task to complete for scientific publication.

6. Required reading

A list of scientific publications required for the course will be distributed amongst confirmed students two weeks before the start of the course.

7. Assessment

Preparation of a short research proposal (powerpoint presentation and two page executive summary) to be presented and submitted 10 days after course completion.

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.