

Biodiversity of Vertebrates (C003936)

Course size *(nominal values; actual values may depend on programme)*

Credits 4.0

Study time 120 h

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)

Dutch

Gent

lecture

independent work

excursion

Lecturers in academic year 2023-2024

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WE11

lecturer-in-charge

Offered in the following programmes in 2023-2024

[Bachelor of Science in Biology](#)

[Preparatory Course Master of Science in Biology](#)

crdts

offering

4

A

4

A

Teaching languages

Dutch

Keywords

Craniata, Vertebrates, Biodiversity, Evolution, Anatomy, Phylogeny, Systematics, Field experience, Fauna Belgica.

Position of the course

Giving an overview of the vertebrate animals (Craniata), by providing knowledge and insights in the evolutionary relationships between vertebrate groups, the evolutionary transition between major clades, and the diversity and systematics of the major vertebrate lineages. A basic knowledge is obtained on the typical anatomical traits of vertebrate groups. Special attention is also given to the skills in observing and recognising Belgian vertebrate fauna in the field.

Contents

About 540 million years ago, chordate animals arose that were supported by a chordal rod but still lacked vertebrae or a skull. The oldest fossil evidence that indicates the origin of animals with a skull (Craniata) goes back to about 530 million years, after which the anatomical diversity rapidly expanded with the formation of an articulated skeletal system: the vertebral column. This was a new step in the evolutionary success of true vertebrates (Vertebrata), giving rise to jawless fishes, cartilaginous fishes, bony fishes, amphibians, reptiles, birds and mammals.

In this course, first the invertebrate-to-vertebrate transition is considered, including the general features of the Craniata. Following is a short overview of all major craniate groups, how they are characterised anatomically, how they are related to each other, and what level of diversity exists within the groups. Clades being dealt with are: (1) Cyclostomata (Myxini or hagfish and Petromyzontida or lampreys), (2) Ostracodermi (fossil agnathans), (3) Placodermi and Acanthodii (fossil transitional groups towards the Gnathostomata), (4) Chondrichthyes (cartilaginous fishes), (5) Actinopterygii (ray-finned bony fishes), (6) Sarcopterygii (lobe-finned bony fishes, and the transition towards the Tetrapoda), (6) Lissamphibia (recent amphibians), (7) Sauropsida (reptiles, incl. the transition from Dinosauria to the Aves or birds), (8) Aves (birds, being a specialised group of sauropsids), (9) Synapsida (with the transition towards Mammalia), and (10) Mammalia (mammals). As indicated, special attention is given to some of the important transitions during vertebrate evolution, that is those having given rise to Gnathostomata, Tetrapoda, Amniota, Aves and Mammalia. In a last lecture, the focus is more specifically about primates and human evolution. For each of the groups, examples are given of Belgian fauna.

In the practical part, this course targets field skills in observing and recognising Belgian

vertebrate fauna in the wild. In this way, this course is complementary to the activities for field knowledge foreseen in the courses "Biological Excursions" (Bach 2) and "Biological Field Research" (Bach 3). Students will already be informed during the first bachelor year about the practical skills needed for performing field observations and making field notes (using a manual). At the start of this course in the second year, these practical skills will be demonstrated in the field, during a guided excursion to a nature reserve. During the first semester, students will perform field observations in a self-sustained manner, and keep track of their field observations in a log book. Within the facilities of the "Bio Space", students will be supervised and assisted in their identification of species, and the making of field notes. This will improve the knowledge of species of Belgian vertebrate fauna, but also the practical skills needed to perform field observations and reporting.

Initial competences

This course builds upon the learning outcomes of secondary education, but also relies on the knowledge of invertebrate ancestors to the vertebrate lineage (course "Biodiversity of Invertebrates" - Bach 1).

Final competences

- 1 Students have a good knowledge of scientific terminologies associated with systematics, phylogeny and anatomical traits of the major groups of vertebrates.
- 2 Students have a good knowledge of the diversity of the major vertebrate lineages, and their typical traits.
- 3 Students understand the basics of evolutionary relationships (current phylogenetic hypotheses and transition between groups).
- 4 Students recognize the major groups based on their external and anatomical features, through the application of the theoretical knowledge, as well as based on personal observations in the field.
- 5 Students are also capable of using identification keys to recognise vertebrate groups and species, and by discussing with fellow students and/or teaching assistants, they come to a conclusion for species attribution.
- 6 Students can recognise Belgian vertebrate species, and classify them within the vertebrate taxa. They rely on skills to perform and report field observations using a log book.
- 7 Based on their comprehension of Belgian vertebrate diversity, and being able to recognize the majority of Belgian vertebrate groups and species in the field, they are able to value the biotic vulnerability and hence necessity for its conservation within a natural-societal context.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Excursion, Lecture, Independent work

Extra information on the teaching methods

- **Theory:** 15 lectures (lecture notes available through Ufora).
- **Field work:** 1 afternoon guided excursion, where field observations and log book note taking is demonstrated.
- **Self-sustained activities:** 15 hours of observations performed by the students in a self-sustained manner (can be an organised excursion by a society), during which they keep a log book with their observations. This log book is required to be revised by the teaching assistant at least one time during the semester. Students can use the facilities provided in the context of the "Bio Space", such as identification keys and literature, as well as they can get advice and support from the teaching assistants for performing the observations and reporting in the field.

Learning materials and price

- A syllabus and lecture slides will be available (bound volumes, slides in color), published by Academia Press (www.academia.press), costing about €35.
- Cost for the manual for the field work approximately €5. Lecture notes will be available through Ufora.

References

- **Textbook:** Vertebrate Life - Pough, Janis & Heiser (8th editie, 2009, ISBN 0-321-60079-7) price ± 100€
- **Identification guides:** see link Bio Space (<http://www.ecology.ugent.be/soortenkennis/nl>).

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- **Identification apps** (Android) - Dutch:
 - Zoetwatervissen van Nederland (ETI Bioinformatics - free app) (https://play.google.com/store/apps/details?id=com.phonegap.vissen&feature=more_from_developer#?t=W251bGwsMSwyLDEwMiwiY29tLnBob25lZ2FwLnZpc3NlbiJd)
 - Vissengids (zoet- en zoutwater, free app) (https://play.google.com/store/apps/details?id=com.vissen&feature=search_result#?t=W251bGwsMSwyLDEsImNvbS52aXNzZW4iXQ..)
 - Reptielen en amfibieën van Nederland (ETI Bioinformatics - free app) (https://play.google.com/store/apps/details?id=nL.uva.eti.herpetofauna&feature=search_result#?t=W251bGwsMSwyLDEsIm5sLnV2YS5ldGkuaGVycGV0b2ZhdW5hIl0..)
 - Vogels van Europa (ETI Bioinformatics - 9.99€ - including bird songs) (https://play.google.com/store/apps/details?id=nL.uva.eti.vogels_EU&feature=more_from_developer#?t=W251bGwsMSwyLDEwMiwiY29tLnBob25lZ2FwLnZpc3NlbiJd)
 - Zoogdieren van Nederland (ETI Bioinformatics- 5.99€) (https://play.google.com/store/apps/details?id=nL.uva.eti.zoogdieren&feature=search_result#?t=W251bGwsMSwyLDEsIm5sLnV2YS5ldGkuem9vZ2RpZXJlbiJd)
- **Log book app** (Android) - Dutch/English:
 - ObsMapp (free app) - through this app, species list of Belgian fauna can be downloaded and used to indicate observed species. It also combines observations with metadata, such as geographic location, pictures, and other information (https://play.google.com/store/apps/details?id=org.obsmap&feature=nav_result#?t=W251bGwsMSwyLDND)

Course content-related study coaching

At the end of the lecture series, students can request for one or more additional lectures for further clarifications of the topics taught during the semester. During the scheduled afternoons for practical work, students can also request for additional clarifications on course topics, or make an appointment. All lecture notes used during the theoretical classes and practical work will be available through the internet.

Students can have their field observations and report (log book) followed-up by teaching assistants (after making an appointment). All students do submit at least once their log book for evaluation, and this prior to the non-periodic evaluation.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Skills test, Oral assessment, Written assessment with open-ended questions, Assignment

Examination methods in case of periodic assessment during the second examination period

Skills test, Oral assessment, Written assessment with open-ended questions, Assignment

Examination methods in case of permanent assessment

Skills test, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Periodic evaluation:

- *Theoretical part*: written and oral evaluation (with written preparation), using open questions and terminologies that need to be explained. During this part, the evaluation focuses on concept knowledge and insight in the obtained knowledge on vertebrate diversity, evolution and anatomy.
- *Practical part*: the final evaluation of the portfolio (log book) done through an oral evaluation of the observations and reporting done of the field work. This evaluation take place during the exam of the theoretical part.

Non-periodic evaluation:

- Follow-up of the log book (portfolio), providing feedback on the observation and reporting skills for field work.

Calculation of the examination mark

The total score is based upon the items listed below, but is not strictly a calculated average. The final score can deviate maximally 2 points from this average, depending on the individual scores for the different items.

Periodic evaluation: exam of the theoretical classes (accounts for 2/3 of the total score) and

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evaluation of the portfolio and observational skills (based on log book) (accounts for 1/3 of the total score).

Non-periodic evaluation: this is not scored separately, but intermediate evaluations of the log book will be taken into account qualitatively for the final evaluation of the practical part.

Students who legitimately fail to meet the deadline to submit the log book, must inform the lecturer and/or assistant before the deadline. They can then submit the log book at a different time. In case of an unjustified absence in submitting the log book, the total score (theory + practical exercises) will be reduced to the highest non-deliberative quotation (7/20), irrespective of the score for the theoretical part.

2nd exam period:

Students that did not pass the course in the first exam period, have to redo the theoretical exam in the 2nd period. A new log book has to be submitted only when during the 1st exam period students (1) did not participate to the exam, or (2) did not pass for the log book evaluation, . If having passed for the log book during the 1st period, the scores (log book and oral exam of the log book) will be transferred to the 2nd period, and nothing has to be resubmitted (unless the student requests otherwise).

The log book of the 2nd period has to contain the observations of 15 **new** species, thus additional to the ones already submitted in the log book of the 1st period (5 birds, 4 mammals, 2 amphibians, 1 reptile and 3 fishes).

The final score for the log book obtained during the 1st period (log book only, not the score for the oral exam on the log book) will account for half of the final score for the 2nd period. The score for the extra 15 observations will form the other half. Students who thus did not submit a log book during the 1st period, can only obtain a maximal score of 7.5/15 for the log book during the 2nd period (the oral exam of the new log book remains on 10 credits).