GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Evolutionary Developmental Biology of Animals (C003333)

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

Credits 5.0 **Study time 140 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	English	Gent	peer teaching
			lecture

Lecturers in academic year 2024-2025

Witten, Paul	WE11	lecturer-in-charge
De Clercq, Adelbert	WE11	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Biology	5	A
Exchange Programme in Biology (master's level)	5	A

Teaching languages

English

Keywords

Evolution, development, constraints, canalization, modularity, innovations, Hox-genes, deep homology, model organisms

Position of the course

One of the most important results of evolutionary research is the observation that diversity in body plans and morphology of organisms across phyla is not mirrored by genetic diversity. Thus, the question arises how innovations of the Bauplan arise if they cannot be detected in the genome?
Evo-devo research has revealed that the diversity in animal and plant forms can be attributed largely to evolutionary changes in the expression of genes that guide (embryonic) development. Many of these genes are conserved in widely divergent groups of organisms. Spatio-temporal changes in expression of these genes have led to an astonishing range of body forms. Moreover, not only genes are conserved, but also signaling pathways.
The aim of this course is to provide an insight into the evolution of (embryonic) developmental processes through integration of genetic, evolutionary and developmental data. These processes are illustrated by means of examples from the animal kingdom.

Contents

Topics are, a.o.:
- History of the discipline 'Evolutionary Developmental Biology' (Evo-devo)
- Constraints in the development of organisms
- Canalisation of development, and the release of constraints
- Innovations of the Bauplan
- Role of Hox genes in innovations of the Bauplan
- Homologous pathways of development and deep homology
- Modularity of development
- Evolution of larval forms
- The phylotypic stage and its role in evo-devo
- Evo-devo of vertebrate organs or systems (skeleton, dentition, appendages, head)

Initial competences

Succesfully passed courses on developmental biology, genetics, molecular techniques, biodiversity of invertebrates and vertebrates (including histology and comparative anatomy), or having acquired the competences therein in another way.

Final competences

1 The students have insights into the history of Evolutionary Developmental Biology.
2 The students apply their knowledge of developmental processes in the explanation of the Bauplan.
3 The students acknowledge the importance of placing developmental data into a phylogenetic context.
4 The students understand how genetic, evolutionary and developmental data are integrated to explain the evolution of Baupläne.
5 The students analyze recent literature in a critical way.
6 The students discuss in group the weak and strong points of published research.

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

Lecture, Peer teaching

Extra information on the teaching methods

Theory: classes, use of multimedia
Microteaching: oral presentation of a recent paper in evo-devo research, followed by an in-depth discussion ('journal club')

Study material

Type: Slides

Name: All EvoDevo lectures
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 601
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

Gould, S.J. (1977). Ontogeny and Phylogeny. The Belcnap Press of Harvard University Press, Cambridge.
Hall, B.K. (1998). Evolutionary Developmental Biology. Chapman & Hall
Hall, B.K.; Olson, W.M., eds (2003). Keywords and concepts in evolutionary developmental biology. Harvard Univers ity Press, Harvard
Raff, R.A. (1996). The shape of life. Chicago Univers ity Press, Chicago

Course content-related study coaching

Interactive support on Ufora and via email, or personally after electronical appointment.

Assessment moments

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Participation

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Periodic evaluation: Theory: oral exam with written preparation
Non-periodic evaluation: Microteaching: oral presentation, and participation in classes and discussions

Calculation of the examination mark

Periodic evaluation (75%, on the basis of the theory)+ non-periodic evaluation (25%, on the basis of the microteaching and participation).
The marks for the non-periodic evaluation are again taken into account for the second examination chance.
Students need to obtain a sufficient score for both the non-periodic and periodic evaluation in order to pass.