**SYLLABUS** – A COURSE DESCRIPTION

**I. General informaion**

1. Course name: **Developmental biology**
2. Course code: **01-BTA-DEVBIOL**
3. Course type (compulsory or optional): **compulsory**
4. Study programme name: **Biotechnology**
5. Cycle of studies (1st or 2nd cycle of studies or full master's programme): **2nd cycle of studies**
6. Educational profile (general academic profile or practical profile): **general academic profile**
7. Year of studies (if relevant): **I**
8. Type of classes and number of contact hours (e.g. lectures: 15 hours; practical classes: 30 hours):
   **lectures: 15 hours**
   **practical classes: 22 hours**
9. Number of ECTS credits: **3**
10. Name, surname, academic degree/title of the course lecturer/other teaching staff:
    **prof. Jadwiga Jaruzelska, jadwiga.jaruzelska@igcz.poznan.pl, Instytut Genetyki Człowieka PAN**
    **dr hab. Michał Gdula, michal.gdula@amu.edu.pl**
    **dr hab. Kinga Kamieniarz-Gdula, kinga.kamieniarz-gdula@amu.edu.p**
11. Language of classes: **English**
12. Online learning – yes (partly – online / fully – online) / no: **If necessary, the theoretical part could be available by MS Teams or similar platform.**

II. Detailed information

1. Course aim (aims)

   The overall aim of this course to provide the basic knowledge of developmental biology and practical skills related to studying developmental processes occurring in animals. Developmental biology will be described based on different model organisms with special focus on human development and human genetic diseases. The overview of the lectures is the following:

   - variability of sex determination in animals, human sex determination including abnormalities of that process and their medical impact.
   - specification and development of the germ cells: from pre-formation by the presence of the germ plasm in the model organisms such as Xenopus, Danio, Drosophila and Caenorhabiditis, up to animals such as mouse, pig and humans specifying germ cells by induction from peri-implantation cell precursors
   - molecular mechanisms of the body patterning from Drosophila based on morphogenetic gradients up to mammals
   - epigenetics, parental imprinting and human diseases originating from disturbed imprinting
   - mechanisms of X-inactivation and pathologies due to abnormal X-inactivation
   - posttranscriptional control in development including body patterning, germ cell development and sex determination
   - mechanisms of ageing

   The overview of the practical classes:

   -Following animal development using microscopy methods
   -Organ and tissue development on the example of the epidermis and hair follicle (laboratory)
   -Transcriptional and epigenetic regulation of development from a genomics perspective (computational class)

2. Pre-requisites in terms of knowledge, skills and social competences (if relevant)

   The knowledge and skills acquired during the course of the study concerning molecular and cell biology; knowledge of English.

3. Course learning outcomes (EU) in terms of knowledge, skills and social competences and their reference to study programme learning outcomes (EK)

| Course learning outcome symbol (EU) | On successful completion of this course, a student will be able to: | Reference to study programme learning outcomes (EK) |
|---|---|---|

| | | |
|---|---|---|
| EU_01 | Explain basic processes of animal development | BT_W02, BT_W03, BT_W04 |
| EU_02 | Improve and update knowledge of developmental processes in more details based on the proposed literature | BT_U03, BT_U07, BT_K02 |
| EU_03 | Perceive close connections between developmental processes; both in health and disease | BT_W02, BT_W03, BT_W04 |
| EU_04 | Initiate scientific discussions on those topics with colleagues and supervisors | BT_U03, BT_U04, BT_U05, BT_K01, BT_K03 |
| EU_05 | Recognise importance of the research in this field for medicine | BT_K01, BT_W03, BT_U01 |
| EU_06 | Get acquainted with specific terms used in developmental biology | BT_U05, BT_W09 |
| EU_07 | Get familiar with animal models used to study developmental processes | BT_W02, BT_W03, BT_W04, BT_U01 |
| EU_08 | Study developmental processes using microscopy, computationally analyze published microscopy data, and present findings | BT_U01, BT_W07, BT_U03, BT_U05, BT_U06 |
| EU_09 | Take advantage of a genomic browser to access and browse epigenetic developmental data | BT_U01, BT_W01, BT_U03, BT_K01, BT_K02, BT_K03 |
| EU_10 | Appreciate developmental processes viewed at the level of whole organisms, organs/tissues and single cells | BT_W03, BT_W01, BT_U01, BT_U03, BT_K01, BT_K02, BT_K03 |

4. Learning content with reference to course learning outcomes (EU)

| Course learning content | Course learning outcome symbol (EU) |
|---|---|
| Animal and human sex determination including human pathologies of that process | EU_01, EU_02, EU_03, EU_04, EU_05, EU_06, EU_07 |
| Specification and development of germ cell line in lower organisms and mammals | EU_01, EU_02, EU_03, EU_04, EU_06, EU_07 |
| Molecular processes of early stages of the body patterning in lower organisms and mammals | EU_01, EU_02, EU_03, EU_04, EU_06, EU_07 |
| Parental imprinting and human syndromes caused by disruption of that process | EU_01, EU_02, EU_03, EU_04, EU_05, EU_06 |
| X-inactivation and its significance in development | EU_01, EU_02, EU_03, EU_04, EU_05, EU_06, EU_07 |
| Posttranscriptional regulation of development, involvement of RNA-binding proteins and small RNAs | EU_01, EU_02, EU_03, EU_04, EU_05, EU_06, EU_07 |
| Molecular mechanisms of ageing, from Drosophila up to humans | EU_01, EU_02, EU_03, EU_04, EU_05, EU_06, EU_07 |
| Following animal development in model organisms | EU_01, EU_02, EU_03, EU_04, EU_07, EU_08, EU_10 |
| Organ and tissue development on the example of the epidermis and hair follicle | EU_01, EU_03, EU_04, EU_05, EU_06, EU_07, EU_08, EU_10 |

| | |
|---|---|
| Transcriptional and epigenetic regulation of development | EU_01, EU_02, EU_03, EU_04, EU_07, EU_09, EU_10 |

5. Reading list

Books : The literature will be provided to the students at the beginning of the course.

Articles: The literature will be provided to the students at the beginning of the course.

III. Additional information

1. Teaching and learning methods and activities to enable students to achieve the intended course learning outcomes (please indicate the appropriate methods and activities with a tick or/and suggest different methods)

| Teaching and learning methods and activities | |
|---|---|
| Lecture with a multimedia presentation | X |
| Interactive lecture | |
| Problem – based lecture | |
| Discussions | X |
| Text-based work | X |
| Case study work | |
| Problem-based learning | |
| Educational simulation/game | |
| Task – solving learning (eg. calculation, artistic, practical tasks) | |
| Experiential work | X |
| Laboratory work | X |
| Scientific inquiry method | |
| Workshop method | |
| Project work | |
| Demonstration and observation | X |
| Sound and/or video demonstration | X |
| Creative methods (eg. brainstorming, SWOT analysis, decision tree method, snowball technique, concept maps) | |
| Group work | X |

2. Assessment methods to test if learning outcomes have been achieved (please indicate with a tick the appropriate methods for each LO or/and suggest different methods)

| Assessment methods | Course learning outcome symbol | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | EU_1 | EU_2 | EU_3 | EU_4 | EU_5 | EU_6 | EU_7 | EU_8 | EU_9 | EU_10 |
| Written exam | X | X | X | X | X | X | X | | | X |
| Oral exam | | | | | | | | | | |
| Open book exam | | | | | | | | | | |
| Written test | X | | | | | | | X | X | X |
| Oral test | | | | | | | | | | |
| Multiple choice test | | | | | | | | | | |
| Project | | | | | | | | | | |
| Essay | | | | | | | | | | |
| Report | X | | | | | | | X | X | X |
| Individual presentation | X | | | | | | | X | X | X |
| Practical exam (performance observation) | | | | | | | | | | |

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| Portfolio | | | | | | | | | | |

3. Student workload and ECTS credits

| Activity types | Mean number of hours spent on each activity type |
|---|---|
| Contact hours with the teacher as specified in the study programme | 37 |
| Preparation for classes | 10 |
| Reading for classes | 10 |
| Essay / report / presentation / demonstration preparation, etc. | 18 |
| Project preparation | |
| Term paper preparation | |
| Exam preparation | 15 |
| Total hours | 90 |
| Total ECTS credits for the course | 3 |

4. Assessment criteria according to AMU in Poznan grade system

Very good (bdb; 5,0): outstanding performance without errors
Good plus (+db; 4,5): above the average standard but with minor errors
Good (db; 4,0): generally sound work with some errors
Satisfactory plus (+dst; 3,5): fair but with significant shortcomings
Satisfactory (dst; 3,0): performance meets the minimum criteria
Unsatisfactory (ndst; 2,0): fail – considerable further work is required before the credit can be awarded