



Mechanisms of organ formation and congenital malformations development

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| 1. IMPRINT | |
| Academic Year | 2024/2025 |
| Department | Faculty of Medicine |
| Field of study | Medicine |
| Main scientific discipline | Medical sciences |
| Study Profile | General academic |
| Level of studies | Uniform MSc |
| Form of studies | Full time studies |
| Type of module / course | Non-compulsory (elective course) |
| Form of verification of learning outcomes | Credit |
| Educational Unit / Educational Units | Department of Histology and Embryology Center for Biostructure Research 02-004 Warsaw, Chałubińskiego 5 Str.(Anatomicum bldg.) Web site: http://histologia.wum.edu.pl Department office is open for students on working days. Business hours 9: 30 - 14: 00, phone 22 629-5282. |
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2. BASIC INFORMATION

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|-----------------------------------------------|--------------------------------------|-------------------------------|---------------------------------|
| Year and semester of studies | I-V year, summer and winter semester | Number of ECTS credits | 2.00 |
| FORMS OF CLASSES | | Number of hours | ECTS credits calculation |
| Contacting hours with academic teacher | | | |
| Lecture (L) | | | |
| Seminar (S) | | 30 (e-learning) | 1.00 |
| Classes (C) | | | |
| e-learning (e-L) | | | |
| Practical classes (PC) | | | |
| Work placement (WP) | | | |
| Unassisted student's work | | | |
| Preparation for classes and completions | | 30 | 1.00 |

3. COURSE OBJECTIVES

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| O1 | <p>The aim of the course is to provide knowledge about the development of the human body. The scope of the subject complements the knowledge of general embryology and presents in details:</p> <ul style="list-style-type: none"> the principles and mechanisms of morphogenesis and dysmorphogenesis, the methods used for prenatal diagnosis and treatment of fetus in utero as well as the main factors causing birth defects, the mechanisms of molecular regulation of organ development <p>the disturbances of molecular mechanisms leading to selected, most common, congenital malformations</p> |
| O2 | This is the background for further understanding the basis of birth defects in patients encountered by students at many clinics |

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING

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|---------------------------------------------------------------------------------------|---------------------------------|
| Code and number of effect of learning in accordance with standards of learning | Effects in the field of: |
|---------------------------------------------------------------------------------------|---------------------------------|

Knowledge – Graduate* knows and understands:

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|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A.W1. | structure of the human body in the topographical approach (upper and lower limb, chest, abdomen, pelvis, back, neck, head) and the functional approach (skeletal system, muscular system, urinary system, reproductive system, nervous system and sensory system, integumentary system); appropriate Polish and English anatomical, histological and embryological terminology |
| A.W3. | micro-architecture of tissues, extracellular matrix and organs |
| A.W4. | the stages of development of the human embryo, the structure and function of the membranes and placenta, the stages of development of the various organs and the effects of harmful factors on embryonic and foetal development (teratogenic) |
| C.W1. | the normal human karyotype and the different types of sex determination |
| C.W7. | genetic determinants of congenital malformations and selected rare diseases and the possibility of their prevention |
| E.W6. | basic fetal diagnosis and therapy |

Skills– Graduate* is able to:

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|-------|-----------------------------------------------------------------------------------------------------------------------------|
| B.U8. | use medical databases and correctly interpret the information they contain to solve problems in basic and clinical sciences |
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* In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate”, not student is mentioned.

5. ADDITIONAL EFFECTS OF LEARNING

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|-------------------------------------|----------------------------------|
| Number of effect of learning | Effects in the fields of: |
|-------------------------------------|----------------------------------|

Knowledge – Graduate knows and understands:

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|----|--|
| K1 | |
| K2 | |

Skills– Graduate is able to:

| | |
|----|--|
| S1 | |
|----|--|

Social Competencies – Graduate is ready for:

| | |
|-----|---------------------------------------------------------------------------------|
| SC1 | The student is aware of his own limitations and the ability to constantly learn |
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6. CLASSES

| Form of class | Class contents | Effects of Learning |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| S1 | Fertilization, implantation, development of the trilaminar embryonic disc. Immunology of pregnancy. | A.W1.; A.W3.; A.W4.; C.W1.; B.U8.; K.1 |
| S2 | Principles and mechanisms of morphogenesis and dysmorphogenesis. Prenatal diagnosis. | A.W1.; A.W3.; A.W4.; C.W1.; C.W7.; E.W6.;B.U8.; K.1 |
| S3 | Development of the musculoskeletal system and of the skin and its derivatives. Mechanisms of molecular regulation of the somites differentiation and segmentation as well as bones and muscles formation. Development of the skull, vertebrae, the vertebral column, sternum, ribs and skeletal muscles. Molecular control of the development of the skin and its derivatives. Selected congenital malformations of the musculoskeletal system and anomalies of the skin and its derivatives. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S4 | Development of the head and neck. Differentiation of the pharyngeal apparatus: pharyngeal arches, clefts, and pouches. The molecular control of face, nasal and oral cavities, tongue, thyroid gland and salivary glands formation. Congenital anomalies in the head and neck region. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S5 | The main processes involved in the formation of the nervous system. Neural tube differentiation and development of the spinal cord. Formation of the peripheral nervous system. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S6 | Brain vesicle development. Selected birth defects of the central and peripheral nervous system. Development of sense organs - eye and ear. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S7 | Body cavities and the respiratory system development. Differentiation of the conductive and respiratory portions of the respiratory system. Formation of lungs and respiratory tree. Development of the body cavities and serous membranes: pericardial, peritoneal and pleural cavities, diaphragm, mesenteries. Congenital malformations of the respiratory system. Developmental anomalies of the body cavities. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S8 | Development of the cardiovascular system. Signalling and mechanisms controlling formation of the heart tube and further differentiation of the heart. Formation of the vasculature: arterial and venous systems. Fetal circulation and circulatory changes at birth. Development of the lymphatic system. Birth defects of the heart and vessels. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S9 | Formation of the gastrointestinal system. Body folding. Signalling processes involved in the regionalization of primitive gut and its further development. Differentiation of foregut: formation of esophagus, stomach, liver, gallbladder, pancreas and spleen. Formation of the midgut (intestinal loop, cytodifferentiation of epithelium, outer intestinal wall and its innervation) and the hindgut. Selected congenital abnormalities of the gastrointestinal system. | A.W1.; A.W3.; A.W4.; C.W7.; B.U8.; SC1 |
| S10 | Development of the urogenital system. Molecular regulation of the urinary system formation: mesonephros, metanephros. Formation of ureters, urinary bladder, urethra and prostate gland. Development of the genital system: molecular mechanisms and signalling controlling male and female gonads as well as genital ducts and external genitalia formation. Selected birth defects of the urinary and genital systems. | A.W1.; A.W3.; A.W4.; C.W1.; C.W7.; B.U8.; SC1 |

7. LITERATURE

Obligatory

1. Sadler T.W. "Langman's medical embryology", last edition

Supplementary

1. Schoenwolf G.C., Bleyl S.B., Brauer P.R., Francis-West P.H. "Larsen's human embryology", 2015, fifth edition, Elsevier Churchill Livingstone
2. Moore K.L., Persaud T.V.N., Torchia M.G. "The developing human: Clinically oriented embryology", 2016, tenth edition, Elsevier

8. VERIFYING THE EFFECT OF LEARNING

| Code of the course effect of learning | Ways of verifying the effect of learning | Completion criterion |
|------------------------------------------------------------|-------------------------------------------------|-------------------------|
| A.W1.; A.W3.; A.W4.; C.W1.; C.W7.; E.W6.; B.U8.; K.1 | Description of a selected development disorder. | credit from the teacher |

9. ADDITIONAL INFORMATION

The seminars will be held on-line in real time, on Wednesday – the time will be given later.

Regulations:

1. Attendance at classes is obligatory.
2. Absence in two classes is allowed, regardless of the reason for absence.
3. Absence of 3 seminars results in failure to pass the subject.

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ATTENTION

The final 10 minutes of the last class of the block/semester/year should be allotted for students to fill out the Survey of Evaluation of Classes and Academic Teachers