DISCIPLINE FILE

1. Data about the programme

1.1.	"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY
1.2.	FACULTY OF DENTISTRY
1.3.	DEPARTMENT III
1.4.	DISCIPLINE Embryology and Microbiology
1.5.	DOMAIN OF STUDY: HEALTH – Sectorally regulated within the European Union
1.6.	STUDY CYCLE: LICENCE
1.7.	STUDY PROGRAME: DENTAL MEDICINE (ENGLISH)

2.2. Data about discipline

2.1.	Name of the discipline in the educational plan: EMBRYOLOGY
2.2.	Discipline code: MD01F05EN
2.3.	Discipline type (FD/SD/CD): FD
2.4.	Discipline regimen (MD/OPD/): MD
2.5.	The holder of the course activities: Prof. dr. Andreea Didilescu, Senior Lecturer dr. Anca Coricovac, Senior Lecturer dr. Claudiu Călin, Senior Lecturer dr. Mihai Andrei
2.6.	The holder of the seminar activities: Senior Lecturer dr. Anca Coricovac, Senior Lecturer dr. Claudiu Călin, Assistant Prof. dr. Raluca-Paula Vacaru

2.7. Year of study	I	2.8. Semester	I	2.9. Type of evaluation (E/C)	E

2. Total estimated time (hours/semester of didactic activity a self-preparation/study)

I. Academic training (teaching, practical application, assessment)						
3.1. Nr hours/week	4	From which:	3.2. lecture	2	3.3. seminary/ laboratory	2
3.4. Total hours of educational plan	56	From which:	3.5. lecture	28	3.6. seminary/ laboratory	28
Evaluation (nr. of hours): 2						
II. Training/Individual study						

Time allocation	hours
Study of course materials, textbooks, books, study of the recommended minimal bibliography	56
Additional research in the library, research through the internet	12
Performing specific activities for preparing projects, laboratories, elaborating reviews or other tasks	14
Specific preparation activities for projects, laboratory work, assignments, and reports	12
Tutoring	-
Other activities	-
3.7. Total individual study hours	94
3.8. Total hours per semester (3.4.+ 3.7.)	150

3.9. Number of credits	5

3. Preconditions (where applicable)

4.1. of curriculum	-
4.2. of competences	-

4. Conditions (where applicable)

5.1. to conduct the lecture	-
5.2. to conduct the seminar / laboratory	-

6. Learning outcomes

Knowledge	Skills	Responsibility and autonomy
Students must demonstrate an understanding of: **Concepts in general embryology: Reproduction and embryogenesis** - Processes in the gonads: spermatogenesis and oogenesis. Uterine cycle and ovarian cycle - Fertilization (in the fallopian tube) and segmentation; - Implantation and blastocystogenesis; - Gastrulation and neurulation - formation of the embryonic layers and the onset of the nervous system; **Concepts in Special Embryology: the fetal period:** - Derivatives of the embryonic layers. Introductory concepts regarding the development of organs and systems. - Development of the cephalic region: the neurocranium, the viscerocranium, the facial prominences, and the development of the face, nasal cavities, paranasal sinuses and palate; - The pharyngeal region: pharyngeal arches, pouches and grooves; - The mesobranchial field: development of the tongue, thyroid gland and epiglottis; - Development of the pituitary gland; - Odontogenesis and tooth development: the stages of initiation, proliferation, histodifferentiation, morphodifferentiation, mineralization of	Students must be able to: - correctly identify, describe and interpret microscopic images of the various stages of embryonic development and of structures specific to the cephalic and orodental regions; - understand concepts related to general and specific normal embryonic development; - understand concepts related to the development of the head, neck, and dento-maxillary system; - recognize the early signs and causes of developmental disorders; - correlate clinical findings or observed anomalies with the underlying biological processes and the critical periods of intrauterine life during which the disturbances occurred; - correctly and rigorously use terminology specific	Students will be able to: **Ethics:** - commit to continuing education in the field of human development in general, with a particular focus on dento-maxillary development; - integrate this knowledge with information acquired in other core courses **Professional Development:** - demonstrate the acquisition of basic knowledge in areas of interest and specific to their future profession; - critically evaluate new research in the field of embryonic and dento-maxillary development; - work independently to research and effectively utilize information sources and communication resources; - have the ability to collaborate effectively

organic matrices, root development and the tooth's supporting apparatus, and tooth eruption; - The temporomandibular joint (TMJ): development of the condyle, articular disc, and temporal component of the TMJ; - Introduction to the molecular embryology of the head and neck. **Concepts Related to Specific Anomalies of Prenatal Development:** - Anomalies arising during the development of the embryonic germ layers; - Craniofacial developmental anomalies: defects in the development of the face, nasal cavities and palate; - Developmental anomalies of the tongue, thyroid and pituitary gland; - Developmental anomalies of the teeth: causes, mechanisms and clinical aspects; - Infectious, chemical, pharmacological, and physical agents that affect prenatal development.	to embryology in scientific communication and the drafting of medical reports.	within student groups from the practical sessions to carry out projects or case presentations, while respecting the diversity of opinions and the roles assumed within the team; - take responsibility for the proper handling and interpretation of prospective patients' medical data; - demonstrate initiative in understanding the clinical relevance of knowledge about prenatal development for future dental practice.

7. Course objectives (aligned with the learning outcomes)

7.1. General objective	- Acquiring fundamental knowledge regarding human development during the prenatal period (embryonic and fetal stages), providing future dentists with the morphological and conceptual foundation necessary for understanding normal anatomy, the histology of oral tissues, and the etiology of congenital craniofacial anomalies.
7.2. Specific objective	- **Understanding and knowledge of the concepts of general embryology**; familiarizing students with the stages of preembryonic development (gametogenesis), embryonic development (fertilization, segmentation, implantation, blastocystogenesis, gastrulation, neurulation), and the formation of the primary embryonic layers. - **Understanding and knowledge of the fundamental concepts related to the development of organs and systems.** - **Understanding and in-depth knowledge of the development of the head and neck**; understanding and detailed knowledge of the development of the neurocranium and viscerocranium, the facial prominences, the pharyngeal apparatus (pharyngeal arches, pouches and grooves), the mesobranchial field, and how it contributes to the formation of the face, oral cavity and neck. - **Understanding and knowledge of in-depth concepts regarding the development of the tooth and its supporting structures.**

	- Correlating general concepts of embryology with the specific development of the tooth and its supporting structures. **- Understanding and knowledge of in-depth concepts regarding the development of the temporo-mandibular junction.** **- Identifying developmental anomalies of the head, neck and teeth**; recognizing the embryological mechanisms underlying congenital developmental anomalies and the teratogenic factors involved.

8. Contents

8.1. Lecture	**Teaching methods**	**Observations**
General Embryology. Reproduction and Embryogenesis	Interactive display of the teaching material according to the analytical program, using multimedia means, power point presentations. At the end of the course, discussions are held with the students regarding the material presented, with an emphasis on aspects specific to dentistry.	
1.1. The preembryonic period. The primordial germ cell. Processes occurring in the gonads (gametogenesis): spermatogenesis, oogenesis. 1.2. The embryonic period (I). Processes occurring in the fallopian tube: fertilization.		2 hours
2. The embryonic period (II): 2.1. Processes occurring in the fallopian tube: segmentation. 2.2. Processes occurring in the uterus: nidation (implantation) and blastocystogenesis (the unilaminar, bilaminar and trilaminar blastocyst stages).		2 hours
3. The embryonic period (III): 3.1. Processes occurring in the uterus: gastrulation and neurulation.		2 hours
Special Embryology. The Fetal Period		
4.1. Derivatives of the embryonic germ layers. 4.2. Introduction to the development of organs and systems: digestive, respiratory, cardiovascular, urogenital, and musculoskeletal. 4.3. Clinical applications: abnormalities in the development of the embryonic germ layer derivatives.		2 hours
5. Development of the cephalic extremity: 5.1. Development of the membranous and cartilaginous neurocranium. 5.2. Development of the craniofacial musculature. 5.3. Facial prominences and their derivatives. 5.4. Development of the face, nasal cavities, paranasal sinuses, and palate.		2 hours
6. The pharyngeal region: 6.1. The pharyngeal arches. 6.2. The pharyngeal grooves. 6.3. The pharyngeal pouches.		2 hours
7. Major anomalies associated with the development of the face, nasal cavities, and palate: mechanisms and clinical aspects.		2 hours

8.1. The mesobranchial field: development of the tongue, thyroid gland and epiglottis. 8.2. Development of the pituitary gland. 8.3. Developmental anomalies associated with derivatives of the mesobranchial field: mechanisms and clinical aspects.		2 hours
9. Tooth Development (Odontogenesis I). 9.1. The Initiation and Proliferation Stages 9.2. The Histodifferentiation and Morphodifferentiation Stages. Maturation stage. Amelogenesis and dentinogenesis.		2 hours
10. Tooth Development (Odontogenesis II). 10.1. Development of the root and the tooth's supporting structures. 10.2. Introduction to tooth eruption.		2 hours
11. Major developmental disturbances of the teeth.		2 hours
12. Development of the temporomandibular joint (TMJ). Stages in the development of the mandibular condyle and articular disc. The temporal component of the TMJ.		2 hours
13. Introduction to the molecular biology of the head and neck.		2 hours
14. Teratology: infectious, drug-related, chemical and physical agents.		2 hours

Recent Bibliography:

1. Carlson BM (2013). Human embryology and developmental biology. Saunders; 5th edition (facultativ).
2. Fehrenbach MJ, Popowics T. Illustrated Dental Embryology, Histology, and Anatomy. 6th ed. Elsevier; 2024. ISBN: 978-0-443-10424-4. (optional)
3. Kumar GS. Orban's Oral Histology & Embryology - E-Book: Elsevier India; 2023. (optional)
4. Martins DDS, Ionta FQ, Pompermaier Garlet G, Lima RR, Neves AA, Rios D, Lussi A. Developmental Defects of Enamel. Monogr Oral Sci. 2024;32:10-34.10.1159/000538850266. (optional)
5. Moore KL, Persaud TVN, Torchia MG (2015). The Developing Human. Clinically Oriented Embryology. Tenth edition. Saunders Elsevier (optional).
6. Pomp O, Brokhman I, Benvenisty N, et al. Craniofacial developmental biology in the single-cell era. Development. 2023;150(19):dev202077. https://doi.org/10.1242/dev.202077. (optional)
7. Sadler TW, Langman J (2011). Langman's Medical Embryology. Philadelphia, Pa.; London : Lippincott Williams & Wilkins ; 12th edition (optional).

Periodicals (optional**)**

9. Journal of Dental Research
10. Romanian Journal of Morphology and Embryology
11. Annals of Anatomy - Anatomischer Anzeiger

8.2. Laboratory/ practical lesson	**Teaching methods**	**Observations**
1.1. Introduction to applied embryology in dentistry. 1.2. Overview of the course syllabus and laboratory work, occupational safety rules and fire safety regulations. Review of the Regulations Governing the Professional Activities of UMFCD Students.		2 hours
2.1. Gametogenesis. Hormonal regulatory mechanisms. 2.2. Biology of sperm. 2.3. Biology of ovarian follicles. 2.4. The ovarian cycle and the uterine cycle.	PowerPoint presentation; drawings, explanations;	2 hours

2.5. Clinical applications: methods of contraception, infertility.	microscopic examination of histological sections, embryos and human fetuses; imagistic study. At the end of the practical lesson, discussions are held with the students regarding the material presented, with an emphasis on aspects specific to dentistry.	
3. Embryonic and fetal membranes.		2 hours
4.1. Abnormal sites of implantation (ectopic pregnancies). 4.2. Multiple pregnancies. 4.3. Anomalies associated with gastrulation and neurulation.		2 hours
5.1. Introduction to the development of the cardiovascular system. 5.2. Aortic arches. 5.3. Fetal Circulation.		2 hours
6.1. Development of the mandible. 6.2. Development of the maxilla.		2 hours
7. Development of the sensory organs: the eye, the ear, the nose and the skin.		2 hours
8.1. Development of the salivary glands. 8.2. Disorders associated with the development of the salivary glands.		2 hours
9. The main anomalies associated with the development of the skull and pharyngeal arches.		2 hours
10. The Biology of the Pulp-Dentin Complex.		2 hours
11. Biology of the tooth supporting structures.		2 hours
12. Growth and remodelling patterns of the skull and temporomandibular joint.		2 hours
13. Signalling pathways in odontogenesis.		2 hours
14. Practical exam.		2 hours

Recent Bibliography

1. Carlson BM (2013). Human embryology and developmental biology. Saunders; 5th edition (facultativ).
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9. Evaluation

Activity type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Percentag

			e in the final grade
9.4. Lecture	**Eligibility to take the final exam is contingent upon passing the Practical Exam (minimum grade of 5).** **Knowledge Required for a Grade of 5** A grade of 5 certifies that the student has acquired the knowledge and skills strictly necessary to pass the lecture and to understand the material in subsequent years: - possesses fundamental theoretical knowledge of general embryology (primordial germ cell, gametogenesis, fertilization, segmentation, implantation, blastocyst genesis, gastrulation, neurulation, embryonic layers, fetal annexes) and recognizes the major derivatives of the three embryonic layers. - correctly identifies the five facial prominences involved in facial development and the pharyngeal arches (particularly arches I and II), and is able to list their derivatives. - correctly identifies the main stages of tooth development (dental lamina, dental bud, dental germ—the cup and bell stages) and knows which cells produce the component structures of the tooth and the tooth's supporting apparatus. - correctly identifies the mechanism underlying the most common developmental malformations of the cephalic region. - achieves at least 50% of the total score on the final exam. **Knowledge Required for a Grade of 10** A grade of 10 attests to a comprehensive and in-depth mastery of the concepts presented, superior analytical skills, the ability to make interdisciplinary connections, and impeccable medical reasoning: - possesses in-depth theoretical knowledge of general embryology and has a detailed understanding of the basic processes that characterize embryogenesis (primordial germ cell, gametogenesis, fertilization, segmentation, implantation, blastocyst genesis, gastrulation, neurulation, embryonic layers, fetal membranes); is familiar with the	Final Theory Exam: - Written exam; - 45 multiple-choice questions (single correct answer); - Exam duration: 45 minutes. *The score is reflected in the final grade.*	80%

	derivatives of the three embryonic germ layers and possesses knowledge of the development of organs and systems; - correctly identifies each element from which the structures of the neurocranium and viscerocranium, the facial prominences, and all their derivatives originate, and understands the ossification processes of the mandible and maxilla. - correctly identifies each pharyngeal arch, pouch, and groove, accurately identifying which elements derive from each one, without errors. - correctly identifies all stages of development of the tooth and its supporting structures, and is able to demonstrate an understanding of the processes of initiation, proliferation, and histodifferentiation (amelogenesis, dentinogenesis, cementogenesis) and mineralization of organic matrices, the formation of the Hertwig's epithelial sheath and its role, root development, and tooth eruption. - makes advanced clinical correlations; not only identifies an anomaly, but also masters its pathophysiology and the mechanism by which it arises (e.g., failure of neural crest cell migration). - uses academic medical language, demonstrates exemplary ethical conduct throughout the course, and shows the ability to synthesize recent scientific literature.		
9.5. Seminary/ practical activity	A seminary held before the start of a new practical session, during which students will be assessed on the concepts they have learned from the material covered in previous lectures and practical sessions.	**Periodic assessment during the seminar through:** - oral assessment; - analysis of students' responses; - systematic observation of students during practical lessons; - written assessment (summary); - presentations of papers during seminars are taken into account.	10%

		The score is reflected in the final grade.	
	Written Exam **Requirements for a grade of 5:** - possess basic knowledge of gametogenesis, sperm biology and ovarian follicles, embryonic and fetal membranes, multiple and ectopic pregnancies, derivatives of the embryonic layers, aortic arches, fetoplacental circulation, development of the sensory organs, ossification of the mandible and maxilla, development of the paranasal sinuses, development of the salivary glands, biology of the pulp-dentin complex and the periodontal apparatus, growth and remodelling patterns of the skull and temporomandibular joint (TMJ), and major craniofacial and dental developmental anomalies. - identifies basic embryological structures in optical/electron microscopy images or schematic diagrams. **Requirements for a grade of 10:** - has in-depth knowledge of gametogenesis, sperm and ovarian follicle biology, hormonal regulatory mechanisms, the ovarian and uterine cycles, embryonic and fetal membranes, multiple and ectopic pregnancies, anomalies of gastrulation and neurulation, derivatives of the embryonic layers and associated anomalies, aortic arches, fetoplacental circulation, development of the sensory organs, ossification of the mandible and maxilla, development of the paranasal sinuses, development of the salivary glands, biology of the pulp-dentin complex and the tooth-supporting apparatus, growth and remodelling patterns of the skull and temporomandibular joint (TMJ), and the main craniofacial and dental developmental anomalies. - explains and demonstrates an understanding of the biological processes and mechanisms involved, both in normal embryonic and fetal development and in the occurrence of developmental anomalies. - quickly and accurately identifies embryological structures in detail in	**Practical Exam (written):** - Assessment of knowledge acquired during the Practical sessions (summary): writing about 2 topics/ subjects from the covered Practical Sessions; - recognizing, describing, and identifying the component elements in optical/electron microscopy images or schematic images studied during the Practical Labs: writing a response for two images; - exam duration: 20 minutes. *The score is reflected in the final grade.*	10%

	light/electron microscopy images, explaining the exact stage of development.		
9.5.1. Individual project (if applicable)	-	-	-
9.6. Minimum performance standard			
The minimum performance standard consists of a basic understanding of the concepts of general and special embryology covered in the course lectures and practical sessions, at a level sufficient to pass (grade 5).			

Date of completion: **20/07/2026**

Signature of the course holder

Signature of the laboratory holder

Date of approval by the Department Council:

6/11/2026

Signature of the Department Director:
Professor Ionescu Ecaterina, PhD