Sveučilište u Rijeci • Fakultet dentalne medicine
University of Rijeka • Faculty of Dental Medicine

**Course:** Structure and development of the teeth
**Course Coordinator:** Jelena Tomac, MD, PhD, professor
**Department:** Department of histology and embryology, Medical faculty of Rijeka
**Study program:** Integrated Undergraduate and Graduate University Study of Dental Medicine in English
**Study year:** II
**Academic year:** 2021/22

## SYLLABUS

**Course description (a brief description of the course, general instructions, where and in what form the lessons are organized, necessary equipment, instructions for attendance and preparation for classes, student obligations, etc.):**

**The structure and development of the teeth** is an obligatory course of the second year of the Integrated undergraduate and graduate university study of dental medicine and amounts to 2 ECTS.
The course gives the student a thorough understanding of the microscopic structure of teeth and associated tissues, opportunity to understand the complex relationship between the structure and function, providing the basis for the following courses. The embryology segment gives the student an appreciation of the normal development and mineralization of the teeth, and some insight into the developmental anomalies.

**Classes are organized** in the form of lectures, seminars and practicals. Lectures include an overview of the topics that students will discuss in detail during the seminars and in the practical lessons that follow. Students are expected to actively participate in teaching, and their knowledge will be assessed.

In the case that epidemiological conditions do not allow direct classes, classes will be held using one of the platforms for online teaching.

**Assigned reading:**

Selected chapters from:
Nancy A: Ten Cate's Oral Histology, 9th ed. Elsevier
Mescher AL: Junqeira's Basic Histology (text & atlas), 14th ed. Mc.Graw-Hill, Lange
Sadler TW: Langman's Medical Embryology, 13th ed. Wolters Kluwer

**Optional/additional reading:**

https://www.anatomicum.com/en/?articleid=58
http://microanatomy.net/digestive/tooth.htm
http://www.uky.edu/~brmacp/oralhist/html/ohtoc.htm

Berkovitz BKB, Holland GR, Moxham BL: Oral Anatomy, Embryology & Histology, 5th ed. Elsevier

**COURSE TEACHING PLAN:**

**The list of lectures:**

L1. Introduction, oral cavity.
Learning outcomes:
Describe and explain histology of the tissue of the oral cavity. Explain the morphological structure of tooth enamel. Define and understand physical and chemical characteristics as a prerequisite for its adequate function.

L2. Development of head and neck
Explain the formation of the neural tube and the process of cranial bending of the fetus, learn about the development of the stomodeum and pharyngeal arches. Describe the development of the face, oral cavity, tongue, jaw and temporomandibular joint and the possibility of anomalies.

L3. Development of the tooth
Learning outcomes:
Explain the development process of the tooth.

L4. Enamel
Learning outcomes:
Explain the morphological structure of tooth enamel

L5. Amelogenesis
Learning outcomes:
Describe and explain the process of the amelogenesis

L6. Dental pulp
Learning outcomes:
Describe and explain dental pulp structure.

L7. Dentin
Learning outcomes:
Describe and explain the morphological structure of dental pulp and dentin and understand their mutual relationship. Define the differences in the chemical composition and physical properties between dentin and enamel and explain the consequent differences in their structure and function.

L8. Dentinogenesis
Learning outcomes:
Describe and explain process of the dentinogenesis

L9. Cementum
Learning outcomes:

Describe and classify cement and its types, the periodontal ligament and the bone tissue of the dental alveolus and become familiar with their morphological characteristics. Explain the importance of the proper arrangement of the elements in these structures. Interpret the mechanism of cementum formation and root formation in teeth with one or more roots.

L10. Periodontal ligament and alveolar bone
Learning outcomes:
Decsribe and classsify periodontal ligament parts, explain the tissue morphology and histology.

**The list of seminars:**

S1. Oral cavity
Learning outcomes:
Draw early development of teeth. Explain the differences in the origin of specific cell types and ectodermal-mesenchymal interactions during tooth base formation. Analyze the processes of proliferation and morphological formation through the bud, cap, and bell stages. Interpret the processes of organic matrix and mineral deposition during the formation of the tooth crown and root

S2. Amelogenesis
Learning outcomes:
Describe and analyze the processes of enamel development, the formation of enamel prisms and mineralization. Comment on the differentiation and further development of ameloblasts and their numerous functions in the formation of the dental crown.

S3. Development of the tooth
Learning outcomes:
Describe and analyze the mechanism of tooth development. Analyze the development of odontoblasts and their function in the formation of the tooth crown and root. Interpret and analyze enamel and dentin development, the mode of mineralization and the formation of characteristic structures (prisms in enamel, canals in dentin, etc.).

S5. Enamel Learning outcomes:
Interpret and analyze enamel, draw enamel.

S6 . Amelogenesis
Learning outcomes:
Describe and analyze the processes of enamel development, the formation of enamel prisms and mineralization. Comment on the differentiation and further development of ameloblasts and their numerous functions in the formation of the dental crown.

S7. Dentin
Learning outcomes:
Interpret and analyze dentin, draw dentin.

S8. Cementogenesis
Learning outcomes:
Interpret and analyze the process of the cemetogenesis.

S10. Movements of teeth
Learning Outcomes:
Explain and analyze the mechanism of tooth eruption and deciduous teeth replacement. Explain changes under the influence of mechanical forces in specific structures of the periodontium. Explain the changes in dental tissues over the years and analyze the mechanisms of their occurrence and the possibilities of their restoration.

**The list of practicals:**

P1. Structure of the oral cavity and associated structures
Learning outcomes:
Explain and analyze oral cavity tissues.
P2. Bone, ossification, mineralization
Learning outcomes: Explain and analyze the mechanism of ossification and mineralization of the bone.
P3. Tooth development
Learning outcomes:
Analyze the processes of proliferation and morphological formation through the bud, cap, and bell stages. Interpret the processes of organic matrix and mineral deposition during the formation of the tooth crown and root.
P4. Structure of the tooth
Learning outcomes:
Classify and analyze morphological structure of tooth enamel, dentin and cementum.
P5. Test – Recognition of the slides
Learning outcomes:
Analyze, describe and differentiate slides

**Students' obligations:**

Class attendance, including test attendance, is mandatory. If a students are absent for more than 30% of the classes, they will have to repeat the course. Records of attendance are kept for each student.
Students are required to actively participate in all forms of teaching, both in direct and in the case of online teaching.

**Assessment (exams, description of written/oral/practical exam, the scoring criteria):**

Student assessment is carried out according to the current Ordinance on studies at the University of Rijeka.
Student assessment is performed using ECTS (A-F) and number system (5-1). Grading in the ECTS system is performed by absolute distribution. Student work will be assessed and graded during the course and on the final exam. During the course, students may obtain a total of 100 grade points (credits). Students can achieve up to 70% of the final grade during the classes, and a maximum of 30% of the final grade at the final exam.

Grade points during classes can be collected in the following way:
1. Attendance at exercises (up to 4 points)
2. Knowledge in exercises (up to 40 points)

3. Preparation recognition test (up to 26 points)

In the event that, due to epidemiological conditions, direct teaching becomes difficult, scoring will be modified accordingly.

The final exam consists of a written and an oral part.
To pass the written part of the exam, it is necessary to answer more than 50% of the questions correctly. Depending on the percentage of correct answers, it is possible to get up to 29 evaluation points on the written exam.
If the student passes the oral exam, he gets 1 grade point.

The final grade is formed after the oral exam has been passed according to the results shown during the class and in the written exam.

Final grade Grade points
Excellent, 5, A 90-100
Very good, 4, B 75-89
Good, 3, C 60-74
Sufficient, 2, B 50-59

Academic integrity
Respect for the principle of academic integrity is expected from both teachers and students in accordance with the Code of Ethics of the University of Rijeka and the Code of Ethics for students of the University of Rijeka

**COURSE SCHEDULE (for academic year 2021/22)**

| Date | Lectures (time and place) | Seminars (time and place) | Practicals (time and place) | Instructor |
|---|---|---|---|---|
| 14.02.2022 | $8^{30} – 9^{15}$ (L1) | | | Jelena Tomac, MD, PhD, professor |
| | | $9^{15}$-$10^{00}$ (S1) | | Jelena Tomac, MD, PhD, professor |
| | $10^{15}$-$11^{00}$ (L2) | | | Jelena Tomac, MD, PhD, professor |
| | | $11^{00}$-$11^{45}$ (S2) | | Jelena Tomac, MD, PhD, professor |
| | | | $12^{15}$-$13^{45}$ (P1) | Jelena Tomac, MD, PhD, professor |
| 15.02.2022 | | | $8^{30} – 10^{00}$ (P2) | Jelena Tomac, MD, PhD, professor |
| | $10^{15}$-$11^{00}$ (L3) | | | Jelena Tomac, MD, PhD, professor |
| | | $11^{00}$-$11^{45}$ (S3) | | Jelena Tomac, MD, PhD, professor |
| | | | $12^{15}$-$14^{00}$ (P3) | Jelena Tomac, MD, PhD, professor |
| 16.02.2022 | | $8^{30} – 9^{15}$ (S4) | | Jelena Tomac, MD, PhD, professor |
| | $9^{15}$-$10^{00}$ (L4) | | | Jelena Tomac, MD, PhD, professor |

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| | | $10^{15}$-$11^{00}$ (S5) | | Jelena Tomac, MD, PhD, professor |
| | $11^{30}$-$12^{00}$ (L5) | | | Jelena Tomac, MD, PhD, professor |
| | | $12^{00}$-$12^{45}$ (S6) | | Jelena Tomac, MD, PhD, professor |
| | 13-$13^{45}$ (L6) | | | Jelena Tomac, MD, PhD, professor |
| 17.02.2022 | $8^{30}$ – $9^{15}$ (L7) | | | Jelena Tomac, MD, PhD, professor |
| | | $9^{15}$-$10^{00}$ (S7) | | Jelena Tomac, MD, PhD, professor |
| | $10^{15}$-$11^{00}$ (L8) | | | Jelena Tomac, MD, PhD, professor |
| | $11^{00}$-$11^{45}$ (L9) | | | Jelena Tomac, MD, PhD, professor |
| | | $12^{00}$-$12^{45}$ (S8) | | Jelena Tomac, MD, PhD, professor |
| 18.02.2022 | | $8^{30}$ – $9^{15}$ (S9) | | Jelena Tomac, MD, PhD, professor |
| | $9^{15}$-$10^{00}$ (L10) | | | Jelena Tomac, MD, PhD, professor |
| | | $10^{15}$-$11^{00}$ (S10) | | Jelena Tomac, MD, PhD, professor |
| | | | $11^{15}$-$12^{45}$ (P4) | Jelena Tomac, MD, PhD, professor |
| 21.02.2022 | | | $9^{30}$-$11^{00}$ (P5) | Jelena Tomac, MD, PhD, professor |

**List of lectures and seminars:**

| | LECTURES (Topics) | Teaching hours | Location/Lecture room |
|---|---|---|---|
| L1 | Introduction, oral cavity | 1 | Dept. of Histol & Embriol |
| L2 | Development of the head and the neck | 1 | Dept. of Histol & Embriol |
| L3 | Development of the tooth | 1 | Dept. of Histol & Embriol |
| L4 | Enamel | 1 | Dept. of Histol & Embriol |
| L5 | Amelogenesis | 1 | Dept. of Histol & Embriol |
| L6 | Dental pulp | 1 | Dept. of Histol & Embriol |
| L7 | Dentin | 1 | Dept. of Histol & Embriol |
| L8 | Dentinogenesis | 1 | Dept. of Histol & Embriol |
| L9 | Cementum | 1 | Dept. of Histol & Embriol |
| L10 | Periodontal ligament and alveolar bone | 1 | Dept. of Histol & Embriol |
| | **TOTAL TEACHING HOURS** | **10** | |

| | SEMINARS (Topics) | Teaching hours | Location/Lecture room |
|---|---|---|---|
| S1 | Oral cavity | 1 | Dept. of Histol & Embriol |
| S2 | Development of the head and the neck | 1 | Dept. of Histol & Embriol |
| S3 | Development of the tooth | 1 | Dept. of Histol & Embriol |
| S4 | Test | 1 | Dept. of Histol & Embriol |
| S5 | Enamel | 1 | Dept. of Histol & Embriol |
| S6 | Amelogenesis | 1 | Dept. of Histol & Embriol |
| S7 | Dentin | 1 | Dept. of Histol & Embriol |
| S8 | Cementogenesis | 1 | Dept. of Histol & Embriol |
| S9 | Test | 1 | Dept. of Histol & Embriol |
| S10 | Tooth movements | 1 | Dept. of Histol & Embriol |
| | **TOTAL TEACHING HOURS** | **10** | |

| | LABORATORY PRACTICALS (Topics) | Teaching hours | Location/Lecture room |
|---|---|---|---|
| P1 | Structure of the oral cavity and associated structures | 2 | Dept. of Histol & Embriol |
| P2 | Bone, ossification, mineralization | 2 | Dept. of Histol & Embriol |
| P3 | Tooth developement | 2 | Dept. of Histol & Embriol |
| P4 | Structure of the tooth | 2 | Dept. of Histol & Embriol |
| P5 | Test – Recognition of the slides | 2 | Dept. of Histol & Embriol |
| | **TOTAL TEACHING HOURS** | **10** | |

| | FINAL EXAM DATES |
|---|---|
| 1. | 22.02.2022. |
| 2. | 1.03.2022. |
| 3. | 29.03.2022. |