

**Course:** Dental radiology

**Course coordinator:** Assoc. Ph.D. Petra Valković Zujić, MD.

**Department:** Department of Radiology

**Study:** Integrated undergraduate and graduate university study of Dental Medicine

**Year of study:** 3.

**Academic year:** 2022/2023

### SYLLABUS

Information about the course (brief description of the course, general instructions, where and in what form the classes are organized, necessary accessories, instructions on attendance and preparation for classes, student obligations, etc.):

The Dental Radiology course is a required course in the third year of the Integrated Undergraduate and Postgraduate Degree in Dentistry and consists of 15 hours of lectures, 15 hours of seminars and 15 hours of tutorials, totaling 45 hours (3 ECTS).

#### *Aim of the course*

Students will learn about the use of ionizing radiation in imaging the jaws and teeth and adjacent regions with conventional radiographic equipment and CBCT technology. The role of computed tomography and magnetic resonance imaging in dental radiology will be presented in specific indications. Detailed radiological anatomy and pathology of the dentoalveolar system, artifacts and possible errors, and radiological imaging of the anatomical structures of the viscerocranium and neck with common pathologies will be taught. After passing the exam in dental radiology, the dental student will be able to independently take a standard radiograph of the jaw and teeth, interpret the obtained radiographs and match them with the clinical picture so that the clinical examination of inaccessible lesions can be diagnosed from the radiograph.

#### *Course content*

X-ray equipment in dentistry. X-rays and radiation protection. Formation and interpretation method of radiological images. Radiological anatomy of the jaw and teeth. Intraoral and extraoral radiographs; technique, evaluation, typical errors. CBCT. Computed tomography and magnetic resonance in special indications. Imaging of pathological changes of the teeth, periodontium, alveolar process of the jaw, temporomandibular joints, paranasal sinuses, tissues and organs of the facial skull and neck. Trauma. Radiographic evidence of inflammatory, degenerative, and radiation changes. Radiological evaluation of expansive jaw formations.

#### *Teaching*

Teaching is organized through lectures, seminars and tutorials through the platform MS teams. The student is encouraged to study and follow the course content continuously, so that he/she can apply the acquired knowledge in the exercises and clarify the doubts that have arisen during the course. To prepare for the class, it is recommended to read the relevant section from the above literature in order to interpret the visual material in the exercises and to use the knowledge of the exercise instructor. The student is encouraged to actively participate in all

forms of teaching and clarify the concepts learned using visual examples of various radiological techniques to fully understand the material provided in the curriculum.

#### **LEARNING OUTCOMES RELATED TO CATEGORY I. COGNITIVE DOMAIN – KNOWLEDGE**

1. Explain the biological effect of X-rays.
2. Explain the formation of X-rays and artifacts on X-ray images.
3. Distinguish radiography from computed tomography and magnetic resonance in dental radiology. Give an example of the use of radiography, computed tomography, and magnetic resonance in dental radiology and radiology of the neck.
4. Describe the technique of performing panoramic radiographs of the jaw and their application in dental radiology. State the indications for an orthopantomogram. Define the specifics of the device for panoramic radiography of the jaw: argue the advantages and disadvantages of the method. Describe the radiological anatomy of the jaw and teeth.
5. Point out the peculiarities of the dental radiographic device. Break down the different types of oral radiographs.
6. describe and recognize anomalies and disorders of tooth and jaw development.
7. Analyze the dental radiograph before, during and after treatment. Determine the pathological changes of the alveolar process of the jaw.
8. evaluate the radiological symptoms of pathological changes in the jaw and teeth. Distinguish between pathological conditions of teeth on radiographs such as abrasion, attrition, caries, degenerative pulp changes, root resorption, root remnants, calcification.
9. recognition of odontogenic and non-odontogenic expansive lesions of the jaw and teeth.
10. analysis of nutritional and internal secretory disorders affecting the dentoalveolar system, including avitaminosis, metabolic and hormonal disorders.
11. determine and compare periapical lesions and maxillary cysts.
12. describe inflammatory and radiation-induced changes of the jaw and teeth.

#### **LEARNING OUTCOMES RELATING TO CATEGORY II. PSYCHOMOTOR DOMAIN-SKILLS**

1. application of protective measures and means in radiographic examination of jaws and teeth.
2. perform a panoramic radiograph of the jaw under supervision. Demonstrate the specifics of the equipment used for panoramic radiography of the jaw.
3. mastering the technique of placing the patient in position for intraoral radiography of the jaw; radiography of the bitewing, periodontal and apical radiography, occlusal radiography of the jaw.
4. mastering the technique of placing the patient in the correct position for extraoral radiographs, craniogram, cephalometric projection, Waters projection and "reverse" Towne projection.
5. recognize the normal and pathological bone structure of the jaws and teeth.

List of mandatory exam literature:

Mettler, FA. Essentials of radiology. 4th ed. Philadelphia : Elsevier, 2019.

## CURRICULUM

### List of lectures (with titles and explanations):

P1; Radiography, conventional radiography, digital radiography, computed tomography, magnetic resonance in dental radiology and visceral and neck radiology.
<b>Learning outcome:</b> Describe and explain basic radiologic methods of projection imaging of body regions and methods of slice imaging with potential applications in dentistry.
P2; Extraoral radiographs, craniogram, cephalometric radiographs, Waters projection, "reverse" Towne projection. Radiologic anatomy of the viscerocranium including the skull base.
<b>Learning outcome:</b> describe and explain radiographic diagnostic technique in dentistry that provides a comprehensive view of the alveolar system and jaws is taught in detail.
P3; Panoramic radiography of the jaw: formation of radiographs, indications, peculiarities of the device, advantages and disadvantages of the method.
<b>Learning outcome:</b> Intraoral radiographs are processed using various techniques to obtain image information appropriate for the clinical problem. Overview of radiological anatomy of the jaw and teeth (physiological openings).
P4; Special features of dental radiography (RVG) and CBCT. Intraoral radiographs, bitewing radiographs, periodontal and apical radiographs, occlusal radiographs of the jaw.
<b>Learning outcome:</b> name and explain the specifics of dental radiographic equipment, indications, radiographic imaging and interpretation of radiographs.
P5; Interpretation of radiographs, artifacts and their prevention on dental radiographs. DICOM and PACS systems.
<b>Learning outcome:</b> Analyze the occurrence of artifacts on radiographs and the characteristics of artifacts in dental radiology and how to avoid them. Systems for storing medical image documentation will be explored.
P6; Anatomical details of the maxilla and mandible on a radiograph. Temporomandibular joint. Tooth development and age determination.
<b>Learning outcome:</b> describe details of radiographic anatomy of both jaws are taught so that students can distinguish normal findings and variants from pathological findings on radiographs. Describe and analyze development and age determination from dental radiographs. Explain the role in Forensic Medicine.
P7; Abnormalities and disorders in the development of the teeth and jaws.
<b>Learning outcome:</b> list and describe various anomalies and developmental disorders characteristic of this region of the body and their radiological presentation.
P8; Radiological control of teeth before, during and after endodontic treatment. Foreign bodies in the teeth and surrounding structures. Pathological changes of the alveolar process of the jaw. Physiological and pathological resorption.
<b>Learning outcome:</b> Conveys radiographic signs that should be assessed during treatment, radiographic visualization of foreign bodies, and pathologic changes of the alveolar process of the jaw on radiographs.
P9; Radiographic signs of pathological changes of the jaw and teeth. Abrasion, wear, caries, degenerative pulp changes, root resorption, root debris, accumulations of mineralized plaque.
<b>Learning outcome:</b> explain to students the radiographic signs of various degenerative and destructive lesions of the jaws and teeth.
P10; Nutritional and internal secretory disorders affecting the dentoalveolar system: Avitaminosis, metabolic, hormonal and psychological disorders.
<b>Learning outcome:</b> describe and explain the radiologic presentation of certain systemic disorders of the jaws and teeth.
P11; Periapical Lesions. Clean Jaws.

<b>Learning outcome:</b> Interpret typical radiologic patterns of periapical lesions with emphasis on differential diagnosis and clinico-radiologic correlation. Explain cysts in the jaw of various etiologies.
P12; Odontogenic expansive lesions of the jaw and teeth.
<b>Learning outcome:</b> demonstrate the patterns of pathologic changes on radiographs in expansive formations of the dentoalveolar region of odontogenic origin.
P13; Non-odontogenic expansive lesions of the jaws and teeth.
<b>Learning outcome:</b> demonstrate the patterns of pathologic changes on radiographs in expansive formations of the maxillary and mandibular regions of non-odontogenic origin.
P14; Inflammatory and postradiologic changes in the maxillary and dental regions.
<b>Learning outcome:</b> Analyze radiologic changes associated with inflammation and exposure of the jaws and teeth to ionizing radiation are discussed. Name and explain odontogenic and non-odontogenic changes of the paranasal sinuses and foreign bodies in the paranasal sinuses.
P15; Odontogenic and non-odontogenic changes of the paranasal sinuses. Foreign bodies in the paranasal sinuses. Temporomandibular joint.
<b>Learning outcome:</b> Describe and explain radiographic changes of the temporomandibular joint, which are often dental in origin, and the adjacent area of the paranasal sinuses, which is often involved in pathologic changes of the maxillary teeth.

#### List of seminars with explanation:

<p>S1; Generation of X-rays. Biological effect of X-rays. Protection from ionizing radiation. Dosimeter.</p> <p><b>Learning outcome:</b> explain biological effect of ionizing radiation, the different sensitivity of different tissues and the dependence of the damaging effect on the age of the patient are discussed.</p>
<p>S2; Preparation of radiographs, exposure, duration of exposure, technical characteristics of radiographs, artifacts, contrast and resolution of radiographs. Representation of dental structures on a radiograph.</p> <p><b>Learning outcome:</b> describe and explain the importance of protection and how to apply protective agents to individual body parts depending on the imaging technique chosen are discussed.</p>
<p>S3; Traumatic changes in teeth and jaws (Le Fort) and their consequences (ankylosis, dilation, angulation of teeth, resorption - internal and external), pulporeal, deposition of reactive dentin, disappearance of pulporeal and pulpitis.</p> <p><b>Learning outcome:</b> describe and analyze specific radiographic signs of post-traumatic root and alveolar process lesions that cannot be detected on clinical examination are discussed.</p>
<p>S4; Diseases of the bone system affecting the jaws and teeth.</p> <p><b>Learning outcome:</b> describe and analyze specific radiographic changes to the jaws and teeth in certain systemic diseases are discussed.</p>
<p>S5; Radiology and pathology of the paranasal sinuses with reference to the maxillary sinus, relationship to the teeth, mucosal changes, floor of the maxillary sinus.</p> <p><b>Learning outcome:</b> present the radiologic anatomy of the paranasal sinuses and surrounding structures and specific radiologic changes in the pathology of this area.</p>

<p>S6; Pathologic changes at the base of the skull with special reference to cranial nerve lesions, neuralgias, injuries n. VII, perineural spread of tumors.</p> <p><b>Learning outcome :</b> describe and analyse changes from the field of neuroradiology that may manifest clinically in the face, jaws, and teeth</p>
<p>S7; Radiology of the pharynx with special reference to the epipharynx and palatal arches.</p> <p><b>Learning outcome:</b> describe and explain the complex radiologic anatomy of the neck organs, the limitations of the regions visible with imaging techniques, possible connections and barriers are discussed with the epipharynx and palatal arches as examples.</p>
<p>S8; Radiologic anatomy of the neck and lymphatic region of the neck, mineralization of blood vessels and ligaments and presentation on radiographs.</p> <p><b>Learning outcome:</b> describe and analyze anatomic distribution of the lymph nodes of the neck, the lymphogenic routes of spread of pathologic processes, and the methods of radiologic visualization of the lymphatic regions of the neck are discussed.</p>
<p>S9; Radiology and pathology of the salivary glands.</p> <p><b>Learning outcome:</b> present to their peers and mentor the radiologic anatomy of the salivary glands, radiologic imaging methods and relationship to surrounding structures, and the most common pathologies of this region.</p>
<p>S10; Radiology of the floor of the mouth and tongue.</p> <p><b>Learning outcome:</b> explain clinical and radiologic manifestations of diseases of the oral cavity and tongue are discussed.</p>
<p>S11; Radiology of the temporal bone and temporomandibular joint (TM).</p> <p><b>Learning outcome:</b> present the radiographic anatomy of the temporal bone and TM joint and specific radiographic changes associated with pathologic changes in this area.</p>
<p>S12; CBCT examination method, indications and capabilities.</p> <p><b>Learning outcome:</b> explain the principle of operation of CBCT, name and advantages over conventional techniques and possibilities of the device.</p>
<p>S13; CBCT in endodontics and surgery - differences in radiation dose and resolution.</p> <p><b>Learning outcome:</b> explain and analyze the role of CBCT in endodontics</p>
<p>S14; The role of radiographs in periodontics (CBCT, panoramic radiograph and retroalveolar radiograph).</p> <p><b>Learning outcome:</b> explain and analyze importance of radiology in periodontology and the specifics of each examination, name and analyze the most common indications and measurements on radiographs specific to periodontology</p>
<p>S15; CBCT in orthodontics and planning and monitoring the effect of therapy.</p> <p><b>Learning outcome:</b> explain and analyze the importance of CBCT in orthodontics and the specifics of measuring the area of interest will be discussed.</p>

**List of exercises with explanation:**

V 1-15

Students practice positioning the patient for each intraoral and extraoral projection, protection from ionizing radiation, and evaluation of the obtained radiograph. They also practice recognizing and describing typical radiological signs and their changes in the differential diagnosis of pathological changes in the maxillary and dental region.

#### Duties of students:

Participation in all forms of teaching. Attendance at colloquia according to prescribed units. Preparation of a seminar with a presentation to a colleague and the director with a discussion of the problem. Active participation in exercises, practical application of theoretical knowledge. Taking a written and oral examination.

Examination (method of taking the examination, description of the written/oral/practical part of the examination, method of awarding points, evaluation criteria):

#### ECTS Assessment System:

Student grading is conducted according to the current Ordinance on Studies of the University of Rijeka.

Students' work is evaluated and assessed during the course and in the final exam. Out of the total 100 points, a student can obtain 50 points during the course and 50 points in the final exam.

Students are graded according to a numerical system (1-5). Grading in the ECTS system is done by absolute distribution.

Of the maximum 50 points that can be obtained in class, the student must obtain at least 25 points to be admitted to the final exam.

The grading elements and criteria for the Dental Radiology course are: two written colloquia and the grading of a seminar paper that students prepare independently on a given topic. Up to 50% of the grade can be earned in class and the remaining 50% of the grade can be earned on the final exam (out of a total of 100 points, up to 50 points can be earned in class and up to 50 points on the final exam).

Written midterm exams (colloquia) - 40 points.

Students must take two written midterm exams. They may earn a maximum of 20 points (20% of the grade) for each midterm exam.

The midterm exams contain 20 questions, the correct answers to which are converted into evaluation points as follows.

No. of correct answers	Number of points
10	10
11	11
12	12

13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20

A seminar paper prepared independently by the student on a given topic - 10 points.

Each student must prepare a PowerPoint presentation of at least 25 minutes on a given topic. The term paper will be graded on a scale of 1-10 (1 grade = 1 point).

#### Important Notes

Written midterm exams (tests) will be written in 30 minutes.

Students who score less than 25 points in the class have the right to take a retest. Inspection of the results is possible within seven days after taking the midterm exam after prior consultation with the course instructor.

#### Final exam - 50 points

The final exam consists of a written and an oral exam.

#### Final Written Examination:

The final written exam consists of 30 questions. The final written exam tests knowledge that was not asked in the earlier exams. The minimum score for passing the exam is 50%. A maximum of 30 points can be obtained in the final written exam, which are converted into grade points in the following manner:

No. of correct answers	Number of points
15	10
16	11
17	12
18	13
19	14
20	15
21	16
22	17
23	18
24	19

25	20	
26	22	
27	24	
28	26	
29	28	
30	30	

**Final Oral Examination:**  
The final examination consists of a practical test of knowledge on visual material and a theoretical test of knowledge from the entire material.  
In the final oral examination, students can obtain a maximum of 20 points, which are converted into grade points as follows:

Excellent - 20 points  
Very good - 17 points  
Good - 13 points  
Sufficient - 10 points

**- Final grade:**  
- A - 90-100%, excellent (5)  
- B - 75-89.9%, very good (4)  
- C - 60-74.9% good (3)  
- D - 50-59.9% sufficient (2)  
- F - 0-49.9% insufficient (1)

### LESSON SCHEDULE (for the academic year 2022/2023)

Date	Lectures (time and place)	Seminars (time and place)	Exercises (time and place)	Lecturer
6.2.2023.	L 1 - 4 (9:00 – 12:00 h)			Assis. Prof. Petra Valkovic Zujic
			1 - 4 (13:00-16:30h) A Rijeka	Lovro Tkalcic
			1 - 4 (13:00-16:30h) B Sušak	Nina Bartolovic
7.2.2023.	L5 13:00 – 13:45 L6 13:45 – 14:30 L7 15:00 – 15:45			Prof. Damir Miletić (L5-6) Assis. Prof. Petra Valković Zujic, dr. med (L7)



			5 – 7 (16:00 - 18:00) B Rijeka	I. Žuža
			5 – 7 (16:00- 18:00 h) A Sušak	Lovro Tkalčić
8.2.2023.	L 8 - 11 (11:00-13:00 h)			Assis. Prof. P. Valković Zujić, dr. med.
			8 - 11 (14:00- 17:00h) ARijeka	Assis. Prof. P. Valković Zujić, dr. med.
			8 - 11 (14:00- 17:00h) B Sušak	Tin Nadarevic, PhD
9.2.2023.	L 12 - 13 (12:00 – 13:30 h)			Prof. Damir Miletić
		S1 (14:00- 14:45h)		Assis. Prof. Valković Zujić
		S2 (14:45– 15:30h)		Assis. Prof. Valković Zujić
			12-13 (16:00 – 17:30) B Rijeka	Lovro Tkalčić, dr.med.
			13 (16:00 – 17:30) A Sušak	Slavica Kovačić, PhD
10.2.2023.		S3 (8:00 – 8:45 h)		Assis. Prof. Valković Zujić
		S4 (8:45 - 9:30 h)		Assis. Prof. Valković Zujić
		S5 (9:30 - 10:15h)		Prof. D. Miletić
		S6 (10:15 – 11:00h)		Prof. D. Miletić
10.2.2023.	1 <sup>st</sup> COLLOQUIA (13:00 – 14:00h) Lectures 1-7 (Merlin)			
<b>Date</b>	<b>Lectures (time and place)</b>	<b>Seminars (time and place)</b>	<b>Exercises (time and place)</b>	<b>Lecturer</b>

13.2.2023.	L14 - 15 (8:00 – 9:30 h) MS Teams			Prof. Damir Miletić
		S7 (10:00-10:45h)		Prof. Damir Miletić
		S8 (10:45-11:30)		Prof. Damir Miletić
			14-15 (12:00 – 13:30) B Rijeka	Lovro Tkalčić
			14-15 (12:00 – 13:30) A Sušak	Danijela Veljkovic Vujaklija, PhD
14.2.2023.	2 <sup>nd</sup> COLLOQUIMA (8:00 – 9:00h)	lectures 8-15 Merlin		
		S9 (9:45-10:30h)		Assis. Prof. Valković Zujić
		S10 (10:30-11:15h)		Assis. Prof. Valković Zujić
		S11 (11:15-12:00h) MS Teams		Assis. Prof. Valković Zujić
	CORRECTION COLLOQUIMA	13-14h		Merlin
15.2.2023.		S12 (8:00-8:45h)		Prof. Damir Miletić
		S13 (8:45-9:30h)		Prof. Damir Miletić
		S14 (9:30 - 10:15h)		Assis. Prof. Valković Zujić
		S15(10:15 - 11:00)		Assis. Prof. Valković Zujić
16.2.2023.	Written exam	9AM		Merlin
17.2.2023.	Oral exam			Prof. Damir Miletić Assis. Prof. Valković Zujić

**List of lectures, seminars and exercises:**

LECTURES	(Topic of lecture)	Number of teaching hours	Venue.
L1	X-ray radiation, conventional radiography, digital radiography, computed tomography, magnetic resonance in dental radiology and visceral and neck radiology. Interpretation and quality assessment of radiographic images.	1	MS Teams
L2	Extraoral radiographs, craniogram, cephalometric radiographs, Waters projection, "reverse" Towne projection. Radiologic anatomy of the viscerocranium including the skull base.	1	MS Teams
L3	Panoramic radiography of the jaw: origin of radiographs, indications, peculiarities of the device, advantages and disadvantages of the method. Radiological anatomy of the jaw and teeth (physiological openings)	1	MS Teams
L4	Special features of dental radiography (RVG) and CBCT. Intraoral radiographs, bitewing radiographs, periodontal and apical radiographs, occlusal radiographs of the jaw.	1	MS Teams
L5	Systems DICOM. Evaluation of radiographs, artifacts and their prevention on dental radiographs.	1	MS Teams
L6	Anatomical details of maxilla and mandible on radiographs. Tooth development and age determination.	1	MS Teams
L7	Anomalies and disorders in the development of teeth and jaws.	1	MS Teams
L8	Radiological control of teeth before, during and after endodontic treatment. Foreign bodies in the teeth and surrounding structures. Pathological changes of the alveolar process of the jaw. Physiological and pathological resorption.	1	MS Teams
L9	Radiological symptoms of pathological changes in the jaw and teeth. Abrasion, wear, caries, degenerative changes of the pulp, root resorption, root debris, accumulations of mineralized plaque.	1	MS Teams
L10	Disorders of nutrition and internal secretion affecting the dentoalveolar system: avitaminosis, metabolic, hormonal and psychological disorders.	1	MS Teams
L11	Periapical and periodontal lesions. Clean jaws.	1	MS Teams
L12	Odontogenic expansive lesions of the jaw and teeth.	1	MS Teams
L13	Non-odontogenic expansive lesions of jaws and teeth.	1	MS Teams

L14	Inflammatory and radiation-induced changes of jaws and teeth.	1	MS Teams
L15	Odontogenic and nonodontogenic changes of the paranasal sinuses. Foreign bodies in the paranasal sinuses. Temporomandibular joints.	1	MS Teams

	<b>SEMINARS (topics)</b>	<b>Number of teaching hours</b>	<b>Venue</b>
S1	Generation of x-rays. Biological effect of X-rays. Protection against ionizing radiation. Dosimeter	1	Clinical Hospital Centre Rijeka
S2	Production of X-ray images, exposure, exposure duration, technical characteristics of X-ray images, artifacts, contrast and resolution of X-ray images. Representation of dental structures on a radiograph.	1	Clinical Hospital Centre Rijeka
S3	Traumatic changes in teeth and jaws (Le Fort) and their consequences (ankylosis, dilation, angulation of teeth, resorption - internal and external), pulp space, deposition of reactive dentin, disappearance of pulp space and pulpitis.	1	Clinical Hospital Centre Rijeka
S4	Diseases of the bone system affecting the jaws and teeth.	1	Clinical Hospital Centre Rijeka
S5	Radiology and pathology of maxillary sinuses with reference to maxillary sinus, relation to teeth, mucosal changes, floor of maxillary sinus.	1	Clinical Hospital Centre Rijeka
S6	Pathological changes at the base of the skull with special attention to cranial nerve lesions, neuralgias, injuries n. VII, perineural spread of tumor.	1	Clinical Hospital Centre Rijeka
S7	Radiology of the pharynx with special attention to the epipharynx and palatal arches.	1	Clinical Hospital Centre Rijeka

S8	Radiological anatomy of the neck and lymphatic region of the neck, mineralization of blood vessels and ligaments and representation in radiographs.	1	Clinical Hospital Centre Rijeka
S9	Radiology and pathology of salivary glands.	1	Clinical Hospital Centre Rijeka
S10	Radiology of the floor of the mouth and tongue.	1	Clinical Hospital Centre Rijeka
S11	Radiology of the temporal bone and temporomandibular joint (TM).	1	Clinical Hospital Centre Rijeka
S12	CBCT examination method, indications and possibilities.	1	Clinical Hospital Centre Rijeka
S13	CBCT in endodontics and surgery - differences in radiation dose and resolution.	1	Clinical Hospital Centre Rijeka
S14	The role of radiographs in periodontology (CBCT, panoramic radiograph and retroalveolar radiograph).	1	Clinical Hospital Centre Rijeka
S15	CBCT in orthodontics and in planning and monitoring the effect of therapies.	1	Clinical Hospital Centre Rijeka
<b>Total number of seminar hours</b>		<b>15</b>	

	<b>EXERCISES (Exercise theme)</b>	Number of teaching hours	<b>Venue</b>
E1-15	Exercises follow the theme of the lectures and seminars	15	Clinical Hospital Centre Rijeka
	<b>Total number of exercise lessons</b>	<b>15</b>	

Exam terms	
1. COLLOQUIUM	10.2.2023.
2. COLLOQUIUM	14.2.2023.
CORRECTION COLLOQUIUM	14.2.2023.
FINAL WRITTEN EXAM	16.2.2023.
FINAL ORAL EXAM	17.2.2023.
FINAL WRITTEN AND ORAL EXAM	14.3.2023.
FINAL WRITTEN AND ORAL EXAM	11.4.2023.

	SEMINAR SCHEDULE BY NAME	STUDENT
S1	Generation of x-rays. Biological effect of X-rays. Protection against ionizing radiation. Dosimeter	
S2	Production of X-ray images, exposure, exposure duration, technical characteristics of X-ray images, artifacts, contrast and resolution of X-ray images. Representation of dental structures on a radiograph.	
S3	Traumatic changes in teeth and jaws (Le Fort) and their consequences (ankylosis, dilation, angulation of teeth, resorption - internal and external), pulp space, deposition of reactive dentin, disappearance of pulp space and pulpitis.	
S4	Diseases of the bone system affecting the jaws and teeth.	
S5	Radiology and pathology of maxillary sinuses with reference to maxillary sinus, relation to teeth, mucosal changes, floor of maxillary sinus.	
S6	Pathological changes at the base of the skull with special attention to cranial nerve lesions, neuralgias, injuries n. VII, perineural spread of tumor.	
S7	Radiology of the pharynx with special attention to the epipharynx and palatal arches.	
S8	Radiological anatomy of the neck and lymphatic region of the neck, mineralization of blood vessels and ligaments and representation in radiographs.	

S9	Radiology and pathology of salivary glands.	
S10	Radiology of the floor of the mouth and tongue.	
S11	Radiology of the temporal bone and temporomandibular joint (TM).	
S12	CBCT examination method, indications and possibilities.	
S13	CBCT in endodontics and surgery - differences in radiation dose and resolution.	
S14	The role of radiographs in periodontology (CBCT, panoramic radiograph and retroalveolar radiograph).	
S15	CBCT in orthodontics and in planning and monitoring the effect of therapies.	