



Course: Histology with Embryology

Course Coordinator: Prof.dr.sc. Jelena Tomac

Course Collaborators: Prof.dr.sc. Astrid Krmpotić

Prof.dr.sc. Bojan Polić

Doc.dr.sc. Marina Babić-Čač dipl.ing.biol.

Doc.dr. sc. Vedrana Jelenčić mag.ing.mol.biotech.

Doc.dr.sc. Marko Šestan

Department: Department for Histology and Embryology

Study program: University Integrated Undergraduate and Graduate Study of Dental Medicine (in English)

Study year: First

Academic year: 2024/25

SYLLABUS

Course description (a brief description of the course, general instructions, locations and types of lessons, necessary equipment, instructions for attendance and preparation for classes, student obligations, etc.):

Histology with Embryology is a compulsory course during the first year of the Integrated Undergraduate and Graduate University Study of Dental Medicine in English. It consists of 40 hours of lectures, 40 hours of seminars, and 40 hours of laboratory practicals, overall, 120 hours (8 ECTS).

Course objectives

Histology is one of the basic fields of medicine, which deals with the structure of a human body that can be studied using the microscope. Special emphasis is given on the structure of the oral cavity and teeth.

The major role of histology is to provide basic understanding of microscopic structure of tissues and organs. Knowledge about the normal structure is the basis for understanding physiology and also pathophysiological processes.

Embryology studies the development of the embryo from zygote to the newborn. Emphasis is on morphogenesis, especially during development of the face and teeth. Congenital malformations and errors in embryological development are discussed.

Expected course learning outcomes

At the end of this course students will be able to demonstrate a working knowledge of human histology and development, and correlate the structure with the function. Students will acquire a reasonable working knowledge of how cells are organized in the tissues integrated to form the organs.



Students should master the skills of microscopy of the cells, tissues, and organs presented as histological slides. By utilizing their previous knowledge in biochemistry, biology, and anatomy, students should gain insight into the normal structure of the human body by means of light and electron microscopy.

Students should be able to recognize, describe, and differentiate tissue types, as well as organs according to their cellular structure and tissue distribution. He/she should be able to describe the sequence of events leading in implantation and organogenesis and to describe processes associated with development of the face and the teeth.

Course content

Histology part includes the following topics:

The basic tissues – organization and microscopic structure of cells and extracellular substance in the epithelial and connective tissues, muscle tissues and nervous tissue.

Organ system histology - circulatory system, immune system, endocrine glands, respiratory system, digestive tract and associated glands, urinary system, reproductive system, special senses.

Embryology part cover following topics:

Fertilization, cleavage, gastrulation and formation of primary germ layers; differentiation of primary germ layers and organogenesis; fetal membranes and placenta. Periods of intrauterine development, development of the face and oral cavity, development of the temporomandibular joint, birth defects.

Part about the teeth:

Microscopic structure of enamel, dentin-pulp complex, cementum, periodontal ligament, bony socket, gingiva. Early development of teeth (bud, cap, bell) formation and characteristics of ameloblasts, odontoblasts, cementoblast; the formation of mineralized parts of teeth, amelogenesis, dentinogenesis, cementogenesis, development of periradicular tissues and gingiva. Physiological tooth movements: eruption and shedding.

Lectures, seminars and laboratory practicals will take place in the lecture halls of the Medical faculty according to the schedule in the syllabus with the use of histological images from the atlas, microscopes, and histology slides. If for some reason it is not possible to hold a live class, it will be organized online.

Assigned reading:

T.W.Sadler: Langman's Medical Embryology, XIV edition, Wolters Kluwer Health, Philadelphia, 2022.

A.L. Mescher.: Junqueira's Basic Histology, XVI edition, The McGraw –Hill Education, New York 2021.

Nanci A. Ten Cate's Oral Histology. IX edition, Elsevier, 2018.

Optional/additional reading:

<https://www.anatomicum.com/en/?articleid=58>

<http://microanatomy.net/digestive/tooth.htm>

<http://www.uky.edu/~brmacp/oralhist/html/ohdoc.htm>

<http://www.histologyguide.com/index.html>



COURSE TEACHING PLAN:

The list of lectures:

1. Importance of histology
2. Epithelial tissue
3. Connective tissue
4. Blood
5. Cartilage
6. Bone
7. Ossification
8. Nervous tissue
9. Muscle tissue
10. Circulatory system
11. Endocrine glands
12. Urinary system
13. Male reproductive system
14. Immune system
15. Female reproductive system
16. Introduction to embryology, fertilization, 1st and 2nd week of development
17. Gastrulation, Neurulation
18. Respiratory system
19. Sensory organs: Skin
20. Sensory organs: Eye
21. Sensory organs: Ear
22. Periods of intrauterine development
23. Fetal membranes
- 24.25. Development of the head
26. Birth defects
27. Digestive system: Oral cavity
- 28.29. Development of the tooth
- 30.31. Digestive system: Alimentary canal
32. Digestive system: Associated organs
- 33.34. Dentin-pulp complex
35. Enamel
36. Amelogenesis
37. Cement
38. Bony socket, PDL
39. Development of the root
40. Eruption of the tooth



The list of seminars with description:

During seminars, students will discuss in more detail themes explained during the lectures. The seminars also introduce the topics that will be revealed on LP.

1. Epithelial tissue
2. Connective tissue, Cartilage
3. Bone, Osification
4. Nervous tissue
5. Muscle tissue, Circulatory system
6. Endocrine glands
7. Urinary and male reproductive system
8. Immune system
9. Female reproductive system
10. Respiratory system
11. Skin, Ear
12. Eye
13. Embryology: Development of the embryo
14. Embryology: Fetal membranes and placenta
15. Digestive system: Oral cavity
16. Development of the tooth
17. Digestive system: Alimentary canal
18. Digestive system: Associated organs
19. Tissues of the tooth
20. Tooth and associated structures
21. Characteristic of epithelial tissues
22. Characteristic of connective tissues
23. Cyclic changes in female reproductive organs
24. Evaluation of knowledge I
25. Evaluation of knowledge II
26. Dentinogenesis
27. Evaluation of knowledge III
28. Consultations



The list of practicals with description:

LP follows the topics of seminars that precede. Every practical involves an overview of histological slides of tissues and organs using light microscopes and atlases mentioned in literature list. The student have to draw a sketch of the tissues and organs presented on slides and discuss it with the teacher or demonstrator.

1. Epithelial tissue
2. Connective tissue, Cartilage
3. Bone, Osteogenesis
4. Nervous tissue and system
5. Muscle tissue, Circulatory system
6. Endocrine glands
7. Urinary and male reproductive system
8. Immune system
9. Female reproductive system
10. Respiratory system
11. Skin, Ear
12. Eye
13. Embryology I
14. Embryology II
15. Digestive system I: Oral cavity
16. Tooth development
17. Digestive system II: Alimentary canal
18. Digestive system III: Associated organs
19. Tooth structure I
20. Tooth structure II
21. Slide repetition
22. Slide recognition

Students' obligations:

Class attendance is mandatory. Students may be absent from 30% of each form of teaching provided they have a justifiable cause. Absence from practicals must be compensated at the end of the course.

If a student is absent for more than 30% of the classes, he/she will have to re-enroll the course. Students are expected to actively participate in all aspects of the course, create sketches in a notebook during practicals, and attend the examinations. Moreover, preparation of the course content, which is going to be discussed during seminars and practicals, is obligatory.

During practicals, students are obligated to have tools (a notebook without lines, a blue and a red pencil, white coat).



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

Grading of students' work will be conducted according to the current Ordinance on Studies of the University of Rijeka.

Assessment of student work

Students' 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. 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.

Evaluation of students' progress during classes, midterms, and the final exam in the academic year 2023/20243 is shown in Table 1.

Table 1. Distribution of grade points in the course "Histology and Embryology"

	Evaluation	Max. grade points
Midterm exams	Midterm exam	15
	Midterm exam	15
	Midterm exam	15
	Total	
Seminars/laboratory practicals	Short exams	3+3
	Accepted notebook	4
Tissue section recognition		15
	Total	70
Oral exam		30
Total		100

Midterm exams

During the course, three written midterm exams are planned. All written midterm exams consist of 40 multiple-choice questions and will be evaluated according to the criteria shown in Table 2.

MT I – 28.04.2025.

MT II – 12.05.2025.

MT III – 26.05.2025.

Table 2. Evaluation of written midterm exams I-III

Number of correct answers	Grade points
17-19	6
20 - 23	10
24 - 26	12
27 – 29	13
30 – 32	14
33 – 36	15
37 – 40	16

Students can retake the midterm exam once - in the case of absence or because they are not satisfied with the obtained grade points. Then, **the points gained from the retaken midterms will be considered.**



Students will have the opportunity to correct one or more midterm exams only once. Correction of the midterm exam I-III will be held at the end of the course (02.06.20245.), before final exams.

During course students can obtain 10 grade points by answering short exams at Merlin, actively attending laboratory practicals and completing a notebook with drawings

Tissue section recognition is a compulsory oral exam and is required for students to be qualified for the final exam. Students can learn for this exam at the Department of Histology using microscopes and tissue slides. At the Tissue section recognition student have to identify at least 8 of the 10 microscopic slides, as well as the structures described (and drawn) during the laboratory practicals. Each slide is evaluated with 0,5; 1, or 1,5 points depending on the student's knowledge, maximum is 15 points. Recognition of tissue sections will be organized during the week prior to every final exam.

Final exam

The final oral exam covers the entire course content. During the final exam, students can obtain a maximum of 30 credits. Students can refuse the grade if he/she is not satisfied with it. In that case, he/she must retake the final exam.

Students who accomplish 35 or more grade points during course (or after correction of the midterm exams) and pass Tissue section recognition can access the final exam.

Student who achieves less than 35 grade points during course even after the correction of the midterm exams, or didn't pass Tissue section recognition or is absent for more than 30% of classes, cannot take the final exam, is graded as unsuccessful (F) and must re-enter the course next year.

The final grade represents a sum of all grade points obtained during course and on the final exam according to the following criteria:

90-100 points	A	5
75 – 89 points	B	4
60 – 74 points	C	3
50 – 59 points	D	2
0 – 49 points	F	1

Final exam dates

04.06.2025,
11.07.2025
05.09.2025
24.09.2025

Other important information regarding to the course:

It is expected that all students follow the Code of Academic Honesty in accordance with the Code of Ethics for the students of the University of Rijeka

(<https://uniri.hr/wp-content/uploads/2019/05/Etic48dki20kodeks20za20studente20i20studentice.pdf>) .

For questions and concerns, please feel free to contact us by e-mail or via Merlin.



COURSE SCHEDULE (for the academic year 2024/2025)

Day	Lectures (time and place)	Seminars (time and place)	Practicals (time and place)	Instructor
14.04. 2025	L1,L2 (9,15-11,00) Dept.of histology			Prof.dr.sc. J Tomac
		S21 (11,15 – 12,00) Dept.of histology		Prof.dr.sc. J Tomac
		S1 LP1 , (12,30 – 14,45) Dept.of histology		Doc.dr. V Jelenčić
15.04. 2025	L3,L4 (10,15-12,00) Lecture room P3			Prof.dr.sc. B Polić
		S22 (12,15-13,00) Lecture room P3		Prof.dr.sc. B Polić
	L5 (13,15-14,00) Lecture room P3			Doc.dr.sc. M Babić Čač
16.04. 2025	L6,L7 (10,00 -12,00) Lecture room P15			Prof.dr.sc. A Krmpotić
		S2, LP2 (12 ¹⁵ -14 ³⁰) Dept.of histology		Doc.dr. V Jelenčić
17.04. 2025	L8 (9,15-10,00) Lecture room P15			Prof.dr.sc. J Tomac
	L9,L10 (10,00-11,00) Lecture room P15			Prof.dr.sc. A Krmpotić
18.04. 2025		S3 LP3 (8,30-11,30) Dept.of histology		Doc.dr.sc. M Šestan
22.04. 2025		S4LP4 (8,30 -10,45) Dept.of histology		Doc.dr.sc. M Babić Čač
	L11 (11,15-12,00) Lecture room P6			Doc.dr. V Jelenčić
23.04. 2025	L12,L13 (10,15- 12,00) Lecture room P4			Prof.dr.sc. A Krmpotić
		S5LP5 (12,30 -15,30) Dept.of histology		Doc.dr. V Jelenčić



24.04. 2025		S6LP6 (8,30-10) Dept.of histology		
	L14 (10,15-11,00) Lecture room P7			Prof.dr.sc. A Krmpotić
	L15 (11,15-12,00) Lecture room P7			Prof.dr.sc. J Tomac
		S23 (12,15-13,00) Lecture room P7		Prof.dr.sc. J Tomac
25.04. 2025		S7LP7 (8,30-10,45) Dept.of histology		Prof.dr.sc. J Tomac
		S8LP68 (11,15-13,30) Dept.of histology		Prof.dr.sc. J Tomac
28.04. 2025		S24 (10,00-11,00) Lecture room P6		Doc.dr.sc. M Babić Čač
		S9LP9 (11,15-14,15) Dept.of histology		Prof.dr.sc. J Tomac
29.04. 2025	L16,L17(11,00-13,00) Lecture room P9			Prof.dr.sc. A Krmpotić
	L18 (13,15-14,00) Lecture room P1			Doc.dr.sc. M Babić Čač
30.04. 2025	L19, (10,15-11) Lecture room P4			Prof.dr.sc. A Krmpotić
	L20 (11,15-12) Lecture room P4			Doc.dr.sc. M Šestan
	L21 (12,15-13) Lecture room P4			Doc.dr. V Jelenčić
02.05. 2025		S10LP10 (8,30-10,00) Dept.of histology		Doc.dr.sc. M Babić Čač
		S11LP11 (10,15- 13) Dept.of histology		Doc.dr. V Jelenčić
05.05. 2025		S12LP12 (9,30-11,45) Dept.of histology		Doc.dr.sc. M Babić Čač
	L22 (12,15-13) Lecture room P5			Prof.dr.sc. J Tomac
	L23 (13,15-14) Lecture room P5			Prof.dr.sc. B Polić
06.05. 2025	L24 (11,15- 12) Lecture room P6			Doc.dr. V Jelenčić
	L25 (12,15- 13) Lecture room P15			Prof.dr.sc. B Polić
	L26 (13,15- 14) Lecture room P15			Prof.dr.sc. J Tomac



07.05. 2025		S13LP13 (12,15-15,15) Dept.of histology	Doc.dr. V Jelenčić
09.05. 2025		S14LP14 (9,15-12,15) Dept.of histology	Doc.dr. V Jelenčić
12.05. 2025		S25 (10,00-11) Lecture room P2	Doc.dr.sc. M Babić Čač
	L27 (11,15-12) Lecture room P15		Prof.dr.sc. J Tomac
13.05. 2025	LP28,L29 (10,15-12) Lecture room P6		Doc.dr. V Jelenčić
	LP30,L31 (12,15-14) Lecture room P9		Prof.dr.sc. J Tomac
14.05. 2025	L32 (10,15-11) Lecture room P1		Prof.dr.sc. A Krmpotić
	L33 (11,15-12) Lecture room P1		Prof.dr.sc. B Polić
	L34,S26 (12,15-14) Lecture room P6		Doc.dr.sc. M Babić Čač
15.05. 2025	L35,L36 (11,15-13) Lecture room P5		Prof.dr.sc. J Tomac
		S15LP15 (13,30 – 15,45) Dept.of histology	Doc.dr. V Jelenčić
16.05. 2025		S16LP16 (8,30-10,45) Dept.of histology	Prof.dr.sc. J Tomac
19.05. 2024		S17LP17 (8,30-11,30) Dept.of histology	Prof.dr.sc. J Tomac
		S18LP18 (11,45-14,00) Dept.of histology	Doc.dr. V Jelenčić
20.05. 2025	L37 (10,15-11) Lecture room P5		Prof.dr.sc. J Tomac
	L38 (10,15-11) Lecture room P5		Prof.dr.sc. J Tomac
21.05. 2025		S19LP19 (9,00-12) Dept.of histology	Prof.dr.sc. J Tomac
22.05. 2025	L39 (10,15-11) Lecture room P15		Doc.dr. V Jelenčić
	L40 (10,15-11) Lecture room P15		Prof.dr.sc. A Krmpotić
23.05. 2025		S20LP20 (9,00-12) Dept.of histology	Prof.dr.sc. J Tomac
26.05. 2025		S27 (11,00-12) Lecture room P8	Doc.dr.sc. M Babić Čač
26.05. 2025		S28, V21 (12,15-15,15)	Doc.dr. V Jelenčić



		Dept.of histology	
28.05. 2025		V22 (9-12) Dept.of histology	Doc.dr.sc. M Šestan

List of lectures, seminars and practicals:

	LECTURES (Topics)	Teaching hours	Location/Lecture room
L1	Importance of Histology	1	Dept.of histology
L2	Epithelial tissue	1	Dept.of histology
L3	Connective tissues	1	P3
L4	Blood	1	P3
L5	Cartilage, Joints	1	P3
L6	Bone	1	P15
L7	Osteogenesis	1	P15
L8	Nerve tissue	1	P15
L9	Muscle tissue	1	P15
L10	Circulatory system	1	P15
L11	Endocrine glands	1	P6
L12	Urinary system	1	P4
L13	Male reproductive system	1	P4
L14	Immune system	1	P7
L15	Female reproductive system	1	P7
L16	Embryology: Intro, Fertilization, 1 st and 2 nd week	1	P9
L17	Embryology: Gastrulation, Neurulation,	1	P9
L18	Respiratory system	1	P1
L19	Sensory organs: Skin	1	P4
L20	Sensory organs: Eye	1	P4
L21	Sensory organs: Ear	1	P4
L22	Embryology: Periods of intrauterine development	1	P5
L23	Embryology: Fetal membranes	1	P5
L24	Development of the head	1	P6
L25	Development of the head	1	P15
L26	Birth defects	1	P15
L27	Digestive system: Oral cavity	1	P15
L28	Development of the tooth	1	P6
L29	Development of the tooth	1	P6
L30	Digestive system: Alimentary canal	1	P9
L31	Digestive system: Alimentary canal	1	P9



L32	Digestive system: Associated organs	1	P1
L33	Dentin-Pulp Complex	1	P1
L34	Dentin-Pulp Complex	1	P6
L35	Enamel	1	P5
L36	Amelogenesis	1	P5
L37	Cement	1	P5
L38	Bony socket, Periodontal ligament	1	P5
L39	Development of the root	1	P15
L40	Eruption of the tooth, Gingiva	1	P15
TOTAL TEACHING HOURS		40	

	SEMINARS (Topics)	Teaching hours	Location/Lecture room
S1	Epithelial tissue	1	Dept.of histology
S2	Connective tissue, Cartilage	1	Dept.of histology
S3	Bone, Osification	2	Dept.of histology
S4	Nerve tissue	1	Dept.of histology
S5	Muscle tissue, Circulatory system	2	Dept.of histology
S6	Endocrine glands	1	Dept.of histology
S7	Urinary, male reproductive system	1	Dept.of histology
S8	Immune system	1	Dept.of histology
S9	Female reproductive system	2	Dept.of histology
S10	Respiratory system	1	Dept.of histology
S11	Skin, Ear	1	Dept.of histology
S12	Eye	2	Dept.of histology
S13	Embryology I: Development of the embryo	3	Dept.of histology
S14	Embryology II: Fetal membranes and placenta	2	Dept.of histology
S15	Digestive system I: Oral cavity	1	Dept.of histology
S16	Tooth development	2	Dept.of histology
S17	Digestive system II: Alimentary canal	2	Dept.of histology
S18	Digestive system III: Associated organs	1	Dept.of histology
S19	Tissues of the tooth	2	Dept.of histology
S20	Tooth and associated structures	2	Dept.of histology
S21	Characteristic of epithelial tissues	1	Dept.of histology
S22	Characteristic of connective tissues	1	P3
S23	Cyclic changes of female reproductive organs	1	P7
S24	Evaluation fo knowledge I	1	P6
S25	Evaluation fo knowledge II	1	P2



S26	Dentinogenesis	1	P6
S27	Evaluation of knowledge	1	P8
S28	Consultations	2	Dept.of histology
	TOTAL TEACHING HOURS	40	

	PRACTICALS (Topics)	Teaching hours	Location/Lecture room
1	Epithelial tissue	2	Dept.of histology
2	Connective tissue, Cartilage	2	Dept.of histology
3	Bone, Osteogenesis	2	Dept.of histology
4	Nervous tissue and system	2	Dept.of histology
5	Muscle tissue, Circulatory	2	Dept.of histology
6	Endocrine glands	1	Dept.of histology
7	Urinary, male reproductive system	1	Dept.of histology
8	Immune system	2	Dept.of histology
9	Female reproductive system	2	Dept.of histology
10	Respiratory system	1	Dept.of histology
11	Skin, Ear	2	Dept.of histology
12	Eye	2	Dept.of histology
13	Embryology I	1	Dept.of histology
14	Embryology II	2	Dept.of histology
15	Digestive system I: Oral cavity	1	Dept.of histology
16	Tooth development	2	Dept.of histology
17	Digestive system II: Alimentary canal	2	Dept.of histology
18	Digestive system III: Associated organs	1	Dept.of histology
19	Tooth structure I	2	Dept.of histology
20	Tooth structure II	2	Dept.of histology
21	Slide repetition	4	Dept.of histology
22	Slide recognition	2	Dept.of histology
	TOTAL TEACHING HOURS	40	

	FINAL EXAM DATES
1.	04.06. 2025.
2.	11.07. 2025
3.	05.09. 2025
4.	24.09.2025



Sveučilište u Rijeci
University of Rijeka



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

Krešimirova 40/42 51000 Rijeka CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

	Lectures	Seminars	Practicals	Total
Total number	40	40	40	120
On-line	0	0	0	0
Percentage	0	0	0	0