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**Federal State Autonomous Educational Institution of Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
RUDN University named after Patrice Lumumba**

**Institute of Medicine**

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educational division (faculty/institute/academy) as higher education programme developer

**COURSE SYLLABUS**

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**Three-dimensional Computer Modeling of Teeth**

course title

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**Recommended by the Didactic Council for the Education Field of:**

**31.05.03 Dentistry**

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field of studies / speciality code and title

**The course instruction is implemented within the professional education programme of higher education:**

**Dentistry**

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higher education programme profile/specialisation title

**2023-2024**

## 1. COURSE GOAL(s)

The goal of the course “Three-dimensional Computer Modeling of Teeth” is to master the theory and practice of application of technology in planning the restoration of defects dentition.

**The objectives** of the discipline are:

- mastering the history of CAD/CAM technology development by students
- mastering the methods of restoration of dental defects by students
- mastering by students of CAD/CAM systems, basic programs
- familiarization of students with the principles of scanning the prosthetic bed
- familiarization of students with the principles of preparation for restoration performed by milling
- mastering by students of practical skills in taking an optical impression from an intraoral camera
- development of practical skills of students on the 3D modeling tab in the proposed inlay/ onlay type program
- development of students' practical skills in the proposed program of 3d modeling of a single crown
- mastering the principles of milling by students

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) “Three-dimensional Computer Modeling of Teeth” is aimed at the development of the following competences /competences in part

*Table 2.1. List of competences that students acquire through the course study*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
PC-2	Being able to prescribe, monitor the efficacy and safety of non-drug and drug treatment	PC-2.6. Providing orthopedic treatment for persons with defects in teeth, dentition within the temporization procedure, rehabilitation of single defects in the dentition, dental prostheses of up to three units (excluding dental implants prosthetics), partial and complete removable laminar denture using modern treatment methods approved for use in medical practice.

## 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective\* component of (B1) block of the higher educational programme curriculum.

\* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
PC-2	Being able to prescribe, monitor the efficacy and safety of non-drug and drug treatment	Science of Dental Materials Propaedeutics of Dental Diseases	Prosthodontics (Complex Prosthetics)

\* To be filled in according to the competence matrix of the higher education programme.

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course “Three-dimensional Computer Modeling of Teeth” is 2 credits (108 academic hours).

Table 4.1. Types of academic activities during the periods of higher education programme mastering (full-time training)\*

Type of academic activities	Total academic hours	Semesters/training modules
		4
Contact academic hours	72	72
Including:		
Lectures (LC)	-	-
Lab work (LW)	72	72
Seminars (workshops/tutorials) (S)	-	-
Self-studies	36	36
Evaluation and assessment (exam/passing/failing grade)	9	9
Course workload	academic hours_	108
	credits	2

#### 5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Introductory lesson History of CAD /CAM systems in dentistry.	Historical Sketch of CAD / CAM systems in the dental development in Russia and abroad. The concept of «CAD / CAM». General system characterization and review of existing CAD / CAM systems in the world.	LW
Structure CAD \CAM systems. production of fashion designs.	Principles and stages of work CAD / CAM systems. Compare CAD-CAM systems for laboratory fabrication of structures and cabinet	LW

<b>Course module title</b>	<b>Course module contents (topics)</b>	<b>Academic activities types</b>
	systems of open and closed. The materials of construction.	
Dissection teeth under orthopedic structures made by milling.	Recovery Methods dentition hard tissue defects. Classification of cavities by Black localization, classification ADO tabs. Formation of cavities, walls, occlusal edges. Preparation under inlay / onlay / overlay inlays, crowns.	LW
Preparation of optical impression (Part 1)	The concept of "optical impression". Overview of 3D scanners and intraoral camera in orthopedic dentistry	LW
Preparation of optical impression (part 2)	Prepare to receive the impression, the basic requirements. matting errors. Stages optical impression removal, obtaining the medial / distal enlarged impression. Quality control of the optical impression. Typical errors when removing optical impression.	LW
Working with the program CAD (part 1)	The main program for example, the company Sirona. Familiarization with the CEREC system user interface (menu: configuration, settings, tools, configuration, calibration).	LW
Working with the program CAD (Part 2)	On-screen toolbar (administrative data entry, equatorial line, preparation line, interproximal contacts, building tool models). Construction of a crown using a buccal image and an occlusion recorder. Central occlusion recorder. Selecting a dental library of teeth.	LW
I certification milestone	Test control	LW
Work program CEREC SW 4 (Part 1)	Tab. Construction of the tabs with the program.	LW
Work program CEREC SW 4 (part 2)	Crown. Construction of the crown with the program	LW
Work program Mill	Work with the milling program (milling previously modeled structures).	LW
Materials for milling prosthetic	Classification of materials for the manufacture of orthopedic structures. Features and indications. Blocks for characterizing aesthetic dentistry during milling.	LW
Sintering process	Sintering. Optimal modes. Influence of parameters on accuracy, durability, aesthetics of future work.	LW
Individualization of restorations	Polishing or glazing restorations. Individualization of ceramic restorations using ceramic materials and paints.	LW
Adhesive inlays and other restorations	Adhesive cementation of restorations. Dual-curing cements. Representatives, their properties and differences. Stages of cementation of various ceramic restorations.	LW
Digital Opportunities	Additional possibilities for digital-gingival production of prostheses, protective guides for templates, preparation of teeth, individual spoons.	LW
II certification	Testing.	LW

Course module title	Course module contents (topics)	Academic activities types
milestone		
Total	Points scored	LW

\* - to be filled in only for **full**-time training: *LC* - lectures; *LW* - lab work; *S* - seminars.

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom equipment and technology support requirements*

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Lab work	Classroom for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	Installing the dental chair with Hiradent 654-3 -1 pc. ED 240 ovens with RS422 (Binder) (9010-0101) (LLC Diaem) - 1pc. RC-2ZT Phantom Frasaco GmbH head trainer Germany

<b>Classroom for Academic Activity Type</b>	<b>Classroom Equipment</b>	<b>Classroom Equipment and technology Support Requirements</b>
		<p>(10130120/190315/0001935) - 1 pc.  Dental tools (set) - 10 pcs.  Workplace student / teacher as part of the system unit, monitor, keyboard - 1 pcs.  Intraoral Camera (10125230/221108/0006472 Korea.) - 1 pc.  Ultrasonic scaler DTE-7DLED - 4 pcs.</p>
Seminars	Classroom for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	<p>Classroom, Equipped with a set of specialized furniture, wheteboard;a set of devices includes portable multimedia projector, laptop,projection screen,stable wireless Internet connection.  Software: Microsoft Windows,MS Office\Office 365,MS TEAMS,Chrome Monitor LED LG 55" 55UF771V Ultra HD, 100Hz, DVB-T2, DVB-C, DVB-S2, USB, WiFi</p>
Computer Lab	Classroom for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	<p>Classroom, Equipped with a set of specialized furniture, wheteboard;a set of devices includes portable multimedia projector, laptop,projection screen,stable wireless Internet connection.  Software: Microsoft Windows,MS Office\Office 365,MS TEAMS,Chrome Monitor LED LG 55" 55UF771V Ultra HD, 100Hz, DVB-T2, DVB-C, DVB-S2, USB, WiFi  The workplace of the student / teacher as part of the system unit, monitor, keyboard - 8 pcs., there is an Internet connection.  Software: Windows 8.1 Corporate (Microsoft Office</p>

Classroom for Academic Activity Type	Classroom Equipment	Classroom Equipment and technology Support Requirements
		Professional Plus 2007, Corporate Licensing Program (Microsoft Subscription) Enrollment for Education Solutions № 86626883от 01.04.2018 г.) Sirona Wibv-systems 1001-02- 160-0445 №№ 1)2-3067086, 2016 2)2-2707139, 2016 3)2-2707136, 2016 4)2-2707154, 2016 5)2-2536154, 2016 6)2-2707122, 2016 7)2-2695658, 2016 8)2-2707144, 2016

\* The premises for students' self-studies are subject to **MANDATORY** mention

## 7. RESOURCES RECOMMENDED FOR COURSE STUDY

### *Main readings:*

1. Methodological texts for seminars and practical training of students on the topic of simple prosthetics with removable dentures [Electronic resource] = Methodology texts for seminar and practical training of students on the theme of simple prosthetic with removable dentures: Educational and methodological manual / I. YU. Lebedenko [i dr.]. - Electronic text data. - M. : Publishing House of RUDN University, 2018. - 76 p.

### *Additional readings:*

1. Prosthetic dentistry [Electronic resource] = Orthopedic dentistry: Working notebook for independent work of the students on discipline "Propaedeutics of dental diseases", Specialty "Dentistry"; teaching aid in English / Comp. S.N. Razumova and others; ed. S.N. Razumova. - Electronic text data. - M. : Publishing House of RUDN University, 2018. - 55 p.

2. Online Resources Portal: Computer technology.

3. [http://ru.wikipedia.org/wiki/portal:Kompyuternye\\_tehnologii](http://ru.wikipedia.org/wiki/portal:Kompyuternye_tehnologii)

4. <https://eduherald.ru/ru/article/view?id=16200>

### *Internet sources*

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>

- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"
- .....

2. Databases and search engines:

- electronic foundation of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine [https:// www .yandex.ru/](https://www.yandex.ru/)
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevierscience.ru/products/scopus/>

*Training toolkit for self- studies to master the course \*:*

1. The set of lectures on the course “Three-dimensional Computer Modeling of Teeth”
2. The laboratory workshop (if any).on the course “Three-dimensional Computer Modeling of Teeth”
3. The guidelines for writing a course paper / project (if any) on the course “Three-dimensional Computer Modeling of Teeth”.
4. ....

\* The training toolkit for self- studies to master the course is placed on the course page in the university telecommunication training and information system under the set procedure.

**8. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF STUDENTS’ COMPETENCES LEVEL UPON COURSE COMPLETION**

The assessment toolkit and the grading system\* to evaluate the competences formation level (PC-2) upon the course study completion are specified in the Appendix to the course syllabus.

\* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

**DEVELOPERS:**

Associate professor of the  
Department of general and  
clinical dentistry named after V.S.

Dmitrieva

\_\_\_\_\_  
position, department

of General and Clinical Dentistry  
named after V.S. Dmitrieva

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position, department

E.N. Gvozdikova

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name and surname

A.M. Avanesov

\_\_\_\_\_  
name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:**



of General and Clinical Dentistry  
named after V.S. Dmitrieva

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name of department

A.M. Avanesov

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signature

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name and surname

**HEAD  
OF HIGHER EDUCATION PROGRAMME:**

First Deputy Director of Institute  
of Medicine

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position, department

S.N. Razumova

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signature

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name and surname