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Federal State Autonomous Educational Institution of Higher Education  
Peoples' Friendship University of Russia named after Patrice Lumumba  
RUDN University

*Medical Institute*

## COURSE SYLLABUS

**Course title**

**Three-dimensional Computer Modeling of Teeth**

**Specialization**

**31.05.03 Dentistry**

**Graduate's Degree**

**Dentistry**

## 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: PC-2

*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
<i>Contact academic hours</i>	72	72
<i>Including:</i>		
Lectures (LC)	-	-
Lab work (LW)	72	72
Seminars (workshops/tutorials) (S)	-	-
<i>Self-studies</i>	36	36
<i>Evaluation and assessment (exam/passing/failing grade)</i>	9	9
<b>Course workload</b>		
academic hours	108	108
credits	3	3

#### 5. COURSE CONTENTS

*Table 5.1. Course contents and academic activities types*

<b>Course module title</b>	<b>Course module contents (topics)</b>	<b>Academic activities types</b>
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 systems of open and closed. The materials of construction.	LW
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

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

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

## 6. 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)
236 - 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 Frasco GmbH head trainer Germany (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.

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
237, 436 - Seminar	Classroom for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	Classroom, Equipped with a set of specialized furniture, whiteboard; 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
437 - Computer lab	Classroom for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment.	Classroom, Equipped with a set of specialized furniture, whiteboard; 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 Professional Plus 2007, Corporate Licensing Program (Microsoft Subscription) Enrollment for Education Solutions № 86626883 от 01.04.2018 г.) Sirona Wibv-systems 1001-02-160-0445

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
		№№ 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

### a) Main readings:

#### 1. Okazaki Masayuki.

The Book of Teeth and Bones / M. Okazaki. - Электронные текстовые данные. - Cambridge Scholars Publishing, 2021. - 149 с.

URL: [https://mega.rudn.ru/MegaPro/UserEntry?Action=Link\\_FindDoc&id=513208&idb=0](https://mega.rudn.ru/MegaPro/UserEntry?Action=Link_FindDoc&id=513208&idb=0)

### b) Additional readings:

#### 1. Wilder Thornton.

Three plays. Our time.-The akin of our teeth.-The matchmaker / T. Wilder. - Книга на английском языке. - Toronto : Bantam Pathfinder, 1972. - 225 p. : il. - 5.00.

- Prosthetic dentistry [Электронный ресурс] = Ортопедическая стоматология : Working notebook for independent work of the students on discipline "Propaedeutics of dental diseases", Specialty "Dentistry"; учебно-методическое пособие на английском языке / Сост. С.Н. Разумова и др. ; под ред. С.Н. Разумовой. - Электронные текстовые данные. - М. : Изд-во РУДН, 2018. - 55 с.

Online Resources Portal: Computer technology.

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

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

Internet sources:

Electronic libraries with access for RUDN students:

<http://lib.rudn.ru/MegaPro/Web>

<http://www.biblioclub.ru>

<http://www.biblio-online.ru>

[www.studentlibrary.ru](http://www.studentlibrary.ru)

<http://e.lanbook.com/>

Databases and search engines:

<http://docs.cntd.ru/>

<https://www.yandex.ru/>

<https://www.google.ru/>

<http://www.elsevierscience.ru/products/scopus/>

## DEVELOPERS:

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A.M.Avanesov

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position, department

signature

name and surname

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