Introduction to Virtual Reality and Artificial Intelligence

1. IMPRINT

Academic Year	2023/2024
Department	Faculty of Medicine and Dentistry
Field of study	Medicine and Dentistry
Main scientific discipline	Medical science
Study Profile	General academic
Level of studies	Uniform MSc
Form of studies	Extramural study (paid)
Type of module / course	Faculty
Form of verification of learning outcomes	Completion
Educational Unit / Educational Units	Digital Imaging and Virtual Reality Lab at the Department of Dental and Maxillofacial Radiology Medical University of Warsaw Binieckiego 6 street, 02-097 Warszawa; phone number 22 116 64 10 e-mail: zrs@wum.edu.pl Department of Dental Propaedeutics and Prophylaxis, 59 Nowogrodzka str., 02-006, Warsaw, phone: 22 625 66 02, e-mail: zpips@wum.edu.pl

Head of Educational Unit / Heads of Educational Units	Digital Imaging and Virtual Reality Lab Piotr Regulski DMD, PhD, Department of Dental and Maxillofacial Radiology Professor Kazimierz Szopiński MD, PhD Department of Dental Propaedeutics and Prophylaxis Leopold Wagner DMD, PhD
Course coordinator	Piotr Regulski DMD, PhD, piotr.regulski@wum.edu.pl
Person responsible for syllabus	Anna Turska-Szybka DMD, PhD, anna.turska-szybka@wum.edu.pl
Teachers	Piotr Regulski DMD, PhD Małgorzata Ponto-Wolska DMD, PhD

2. BASIC INFORMATION

Year and semester of studies	IV year, VIII semester	**Number of ECTS credits**	1.00

FORMS OF CLASSES **Contacting hours with academic teacher**	**Number of hours**	**ECTS credits calculation**
Lecture (L)		
Seminar (S)	5	0,17
Discussions (D)	10	0,33
e-learning (e-L)		
Practical classes (PC)		
Work placement (WP)		
Unassisted student's work		
Preparation for classes and completions	15	0,5

3. COURSE OBJECTIVES

C1	Gaining advanced competences in the latest technologies in dentistry
C2	Presentation of artificial intelligence tools in dentistry and dental radiology
C3	Practical performance of treatments in simulated virtual reality conditions

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING

Code and number of effect of learning in accordance with standards of learning	Effects in the field of morphological, preclinical, and clinical science, legal and organizational foundations of medicine.
Knowledge – Graduate* knows and understands:	
C.W.23.	dental office equipment and instruments used in dental procedures
Skills– Graduate* is able to:	
D.U13.	use and process information using IT tools and modern sources of medical knowledge

5. ADDITIONAL EFFECTS OF LEARNING

Number of effect of learning	**Effects of learning in time**
Knowledge – Graduate knows and understands:	
K1	basics of performing dental procedures
K2	principles of operation of modern solutions and methods in the field of virtual reality and artificial intelligence
Skills– Graduate is able to:	
S1	identify and use new technologies available in dentistry
Social Competencies – Graduate is ready for:	
SC1	use of modern technologies in professional practice

6. CLASSES

Form of class	**Class contents**	**Effects of Learning**
Seminars	S1. Introduction to virtual reality. Aspects of safe use of VR. Goggles, controllers, touch devices. Technologies used in VR and AI. S2. VR applications in dentistry and medicine. Introduction to simulations in the field of radiological anatomy and dental and maxillofacial radiology. Calibration of VR devices. VR controller button layout in simulation.	C.W23. K1 K2

	S3. Introduction to simulation in the field of cavity preparation and filling. Calibration of VR devices. VR controller button layout in simulation. S4. Introduction to simulations in the field of endodontic and prosthetic treatment. Calibration of VR devices. VR controller button layout in simulation. Touch devices. S5. Introduction to artificial intelligence in dentistry and dental radiology: new methods, algorithms and technologies. Discussion of current research results and future directions of development in this field.	
Practical Classes	PC1. VR goggle support: goggles, controllers, haptic devices. Interface with other devices. PC2. Radiological anatomy, dental and maxillofacial radiology in conditions simulated in a VR environment. PC3. Procedure for preparing and filling tooth cavities in the VR environment. Fissure sealing treatment. PC4. The procedure of endodontic treatment and tooth preparation for crowns and bridges in the VR environment. PC5. Practical application of basic artificial intelligence solutions in dentistry.	D.U13. S1 SC1

7. LITERATURE

Obligatory

Virtual Reality in Dentistry, Ivneet Kaur, Lambert Academic Publishing, 2023
Artificial Intelligence in Dentistry, Shaikh, Bekal, Marei, Elsayed, Surdilovic, Jawad, Springer, 2022
Dentomaxillofacial Radiology Journal (selected articles)

Supplementary

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion
C.W23. K1 K2 D.U13. S1 SC1	The VR application allows you to perform the exercise in two modes: training mode and examination mode. To pass, it is required to correctly perform all exercises in training and examination mode.	Pass after completing at least 61% of each exercise in the examination mode

9. ADDITIONAL INFORMATION

Classes take place in exercise rooms and the Technical Radiology Laboratory of the Department of Dental and Maxillofacial Radiology at the University Dentistry Center of the Medical University of Warsaw.
The teaching supervisor of the subject is: Piotr Regulski DMD, PhD, piotr.regulski@wum.edu.pl

The subject is related to the latest research results carried out in Digital Imaging and Virtual Reality Lab at the Department of Dental and Maxillofacial Radiology
Attendance is mandatory at all classes. In case of absence, it is possible to make up classes after consultation with the person conducting the exercises and seminars. Three approaches to the exercises are possible in the examination mode.
The ALARA Student Scientific Club operates at the Department of Dental and Maxillofacial Radiology, supervised by prof. Ph.D. med. Kazimierz Szopiński, kazimierz.szopinski@wum.edu.pl. The work of the scientific group allows you to expand your knowledge of radiology dentistry and involves carrying out scientific and research projects independently or in teams. Students preparing the results of their work have the opportunity to present them at scientific conferences and in cooperation with the Teaching Staff preparation of scientific publications in peer-reviewed journals. Absence or failure to pass the S6 seminar results in failure to complete the course.

ATTENTION

The final 10 minutes of the last class in the block/semester/year should be allocated to students.
Survey of Evaluation of Classes and Academic Teachers