CATHOLIC UNIVERSITY OF CROATIA
SCHOOL OF MEDICINE

Detailed Course Syllabus

I. BASIC COURSE INFORMATION

Study Program Medicine		**Academic Year 2025./2026.**	
Year of Study II.		**Semester** summer	
Name: SELECTED TOPICS IN MEDICAL PHYSICS			
Abbreviation: MEDIZB20	**Code: 279369**	**Status:** elective	**Language**: English
Prerequisites: None			
Total Course Workload			
Lectures 10	Seminars 5	Exercises 15	**Total Hours 30**
ECTS 1			
Textbooks and Materials			
Required	H. Zabel, Medical Physics, Volume 2: Radiology, Lasers, Nanoparticles and Prosthetics, De Gruyter, Berlin/Boston, 2017. M. J. Keeling and P. Rohani, Modeling Infectious Diseases in Humans and Animals, Princeton University Press, Princeton, 2008.		
Supplementary	P. Davidovits, Physics in Biology and Medicine, Academic Press, London, 2013. R. K. Hobbie and B. J. Roth, Intermediate Physics for Medicine and Biology, Springer, Heidelberg, 2015.		

II. TEACHING STAFF

Name and Surname	**E-mail**
Course Holder	
prof. dr. sc. Hrvoje Štefančić	**hrvoje.stefancic@unicath.hr**
Course Collaborator	

Office Hours According to published timetable

III. DETAILED COURSE INFORMATION

Course Description

The course Selected topics in medical physics represents an extension of topics in physics taught during the first year and it provides an introduction to more specialised physical and other quantitative concepts and techniques of importance in modern medicine. After an introduction to quantum physics and quantum technologies, physical aspects of advanced optical technologies such as lasers and endoscopy are presented. Further topics include applications of nanophysics and nanotechnology in medicine, followed by physical basics of prostethics and sensors. Closing topic of the course is centered on mathematical models of spreading processes in populations and their applications in epidemiology.

Expected Educational Outcomes

Describe basic quantum principles and quantum phenomena
Define physical principles of use of advanced optical devices and techniques in medicine
Enumerate applications of nanophysics and nanotechnology in medicine
Differ physical properties of sensors and prostetics
Describe quantitative fundamentals of simulations in epidemiology

Examination and Grading					
To Be Passed	yes	**Exclusively Continuous Assessment**	x	**Included in Average Grade**	No

Prerequisites to Obtain Signature and Take Final Exam

The right to access the final exam is exercised by a full-time student who has been certified by the course holder to have completed all prescribed teaching obligations from the course in accordance with the Ordinance on studies and studying.

Examination Manner

Each exam and final grade consists of three parts: continuous oral and written tests of knowledge and skills during class (20% of the final grade), practical (30% of the final grade) and written exam (50% of the final grade) held at the end of the class.

Method of acquiring points: Continuous activity in class

Grading Manner

Failed (from 0 to 59,9 %)

Passed (from 60 to 100 %)

Detailed Overview of Grading within ECTS

Activity type	ECTS	Grade percentage (%)
Continuous oral and written examinations during classes	**0.2**	**20**
Total in Class	**0.2**	**20**
Practical part of the final exam	**0.3**	**30**
Written part of the final exam	**0.5**	**50**
TOTAL ECTS (Classes + Final Exam)	**1**	**100 %**

Colloquium dates: Daily

Exam dates: According to the published timetable

IV. DAILY CLASS SCHEDULE

Lectures (P) Seminars (S) Exercises (V)

Day	Topic	Teacher
1.	Quantum physics and quantum technologies P (2h) Basics of quantum physics S (1h) Most important quantum phenomena and technologies V (3h) Exercises and simulations	prof. dr. sc Hrvoje Štefančić
2.	Advanced optical devices and technologies P (2h) Fundamentals of laser technologies S (1h) Physical aspects of endoscopy V(3h) Exercises and simulations	prof. dr. sc Hrvoje Štefančić
3.	Nanophysics and nanotechnology in medicine P (2h) Physics in the nano domain S (1h) Nanoparticles and applications V (3h) Exercises and simulations	prof. dr. sc Hrvoje Štefančić
4.	Prosthetics and sensors P (2h) Physical properties of prosthetics S (1h) Sensors and feedback V (3h) Exercises and simulations	prof. dr. sc Hrvoje Štefančić
5.	Mathematical models and simulations in epidemiology P (2h) Mathematical models of disease spreading in populations S (1h) Network models and agent based models V (3h) Exercises and simulations	prof. dr. sc Hrvoje Štefančić