Doctoral School
Warsaw University of Technology

COURSE OFFERED IN THE DOCTORAL SCHOOL

Code of the course		Name of the course	Polish	**Terapie 21. wieku**	
			English	**Therapies for the 21st century**	
Type of the course	specialized				
Course coordinator	Prof. Ewa Bartnik (UW)		Course teacher	Prof. Ewa Bartnik (UW)	
Implementing unit	Center for Advanced Studies WUT	Scientific discipline / disciplines*	chemical sciences, biotechnology, biomedical engineering		
Level of education	doctoral studies	Semester	Winter 2025		
Language of the course	English				
Type of assessment	Zal.	Number of hours in a semester	30	ECTS credits	2
Minimum number of participants	10	Maximum number of participants	50	Available for students (BSc, MSc)	Yes

Type of classes		Lecture	Auditory classes	Project classes	Laboratory	Seminar
Number of hours	in a week	2	-	-	-	-
	in a semester	30	-	-	-	-

* does not apply to the Researcher's Workshop

1. Prerequisites

High school level biology.

2. Course objectives

The aim of the lectures it to show the students how to distinguish what is and what is not based on science in important decisions pertaining to health – the course is about new therapies and methods such as stem cells, vaccines, gene therapy and genetic tests. If interesting things happen they will be added to the course - like the recent treatment of a single baby with a treatment custom made just for him.

3. Course content (separate for each type of classes)

Lecture

Part 1. Genetics

Basic concepts of genetics– genes, DNA, RNA, mutations. Regulation of gene expression.

Genetic diseases. Monogenic and multifactorial diseases. Rare diseases.

Therapies for genetic diseases – gene therapies, RNA therapies, drugs affecting protein structure. Precision medicine – drugs targeted at the cause of the disease

Therapies for rare and neglected diseases – what is possible and what is cost effective.

Cost of gene therapy – why is it so high and does it have to be?

Will we have a GATTACA future – modifications, therapy and enhancement.

Part 2. Cancer – what causes it and why there will never be a single drug for cancer. Introduction to the immune system.

Classical therapies – chemotherapy, radiotherapy.

A short introduction to immunotherapy – why the organism does not see the cancer and what can be done to change that

New therapies – targeted drugs, immunotherapies, checkpoint inhibitors.

Prevention and treatment – anti-cancer vaccines.

Part 3 – metabolic diseases Mitochondrial diseases – types and some (rare) treatments Obesity – causes and treatments (very new ones); additional effects of the new anti-obesity drugs. Diabetes - causes and treatments Diseases of the circulatory system and treatments Part 4 – vaccines – prevention instead of treatment – from killed microorganisms to mRNA vaccines and vaccines to combat cancer. Part 5 Neurodegenerative diseases. Therapies for Alzheimer and Parkinson disease. Part 6 – Stem cells, IPSCs (induced pluripotent stem cells), cloning. Part 7– Animals as (potential) organ donors for transplantation; what has been done so far and what is expected. Part 8– Monoclonal antibodies and their uses (other than treating cancer) Part 9- extra– genetic tests, necessary, redundant and nonsensical
Laboratory

4. Learning outcomes			
Type of learning outcomes	Learning outcomes description	Reference to the learning outcomes of the WUT DS	Learning outcomes verification methods*
Knowledge			
K01	Has organized knowledge in basic genetics, immunology and cancer biology	SD_K2	test
K02	Has organized knowledge on treatment of genetic diseases	SD_K1	test
K03	Has organized knowledge allowing evaluation of “miraculous treatments” in the media	SD_K1	test
Skills			
S01	Can make decisions pertaining to their own health	SD_S1	test
S02	Can explain why vaccination is necessary	SD_S4	test
S03	Can explain why homeopathy is nonsense	SD_S2	test
S04	Understands what stem cells are and what they can and cannot be used for	SD_S1	test
Social competences			
SC01	Understands the need for continuous learning	SD_SC2	active participation during classes
SC02	Understands the need for research on new therapies and the associated ethical problems	SD_SC1	active participation during classes

*Allowed learning outcomes verification methods: exam; oral exam; written test; oral test; project evaluation; report evaluation; presentation evaluation; active participation during classes; homework; tests

5. Assessment criteria
Test, Credits on the basis of participation in the lectures. 2 absences are allowed.

6. Literature
The course is manly based on new publications and some new unpublished data, the references concern the basis of genetics and immunology Primary references: [1] Siddhartha Mukherjee The song of the cell [2] Siddhartha Mukherjee The emperor of all maladies [3] Siddhartha Mukherjee The gene. An intimate history [4] Philipp Dettmer.Immune: A Journey Into the Mysterious System That Keeps You Alive Secondary references: I may provide links to scientific papers written for the general public, not for specialists [1] [2]

7. PhD student's workload necessary to achieve the learning outcomes**		
No.	Description	Number of hours
1	Hours of scheduled instruction given by the academic teacher in the classroom	30
2	Hours of consultations with the academic teacher, exams, tests, etc.	5
3	Amount of time devoted to the preparation for classes, preparation of presentations, reports, projects, homework	5
4	Amount of time devoted to the preparation for exams, test, assessments	10
	Total number of hours	**50**
	ECTS credits	**2**

** 1 ECTS = 25-30 hours of the PhD students work (2 ECTS = 60 hours; 4 ECTS = 110 hours, etc.)

8. Additional information	
Number of ECTS credits for classes requiring direct participation of academic teachers	1
Number of ECTS credits earned by a student in a practical course	