AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Module name: Noninvasive diagnostics methods in medicine

Academic year: 2019/2020 Code: ZSDA-3-0088-s ECTS credits: 3

Faculty of: Szkoła Doktorska AGH

Field of study: Szkoła Doktorska AGH Specialty: —

Study level: Third-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 0

Course homepage: —

Responsible teacher: dr inż. Rydosz Artur (rydosz@agh.edu.pl)

Module summary

Students get knowledge about the methods currently used in the medical diagnostics including both invasive and non-invasive methods. Students can point out the advantages of using noninvasive methods in specific aspects. Students can predict the further research ares for noninvasive methods.

Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence: is able to			
M_K001	Social competences to cooperate in teams working with novel diagnostics methods based on the noninvasive measurements.	SDA3A_W07, SDA3A_U02, SDA3A_W05, SDA3A_K02, SDA3A_U01, SDA3A_U04, SDA3A_W01	Scientific paper
Skills: he can			
M_U001	Skill to evaluate and compare various methods of noninvasive measurements; analyze the physical principles of the methods.	SDA3A_U01	
M_U002	Skill to self study the multidisciplinary problem; to analyze the novel solution in one discipline that can be applied in completely different manner.	SDA3A_U07, SDA3A_U06, SDA3A_U01	
Knowledge: he knows and understands			

M_W001	Knowledge of methods currently used in medical diagnostics: invasive and non-invasive; the ability to predict the future needs in the medicine.	SDA3A_W02, SDA3A_W01	Scientific paper

Number of hours for each form of classes

	Form of classes										
Suma	Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
30	20	0	10	0	0	0	0	0	0	0	0

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
Social competence: is able to												
M_K001	Social competences to cooperate in teams working with novel diagnostics methods based on the noninvasive measurements.	+	-	+	-	-	-	-	-	-	-	-
Skills: he can												
M_U001	Skill to evaluate and compare various methods of noninvasive measurements; analyze the physical principles of the methods.	+	-	+	-	-	-	-	-	-	-	-
M_U002	Skill to self study the multidisciplinary problem; to analyze the novel solution in one discipline that can be applied in completely different manner.	+	-	+	-	-	-	-	-	-	-	-
Knowledge: he knows and understands												
M_W001	Knowledge of methods currently used in medical diagnostics: invasive and non-invasive; the ability to predict the future needs in the medicine.	+	-	+	-	-	-	-	-	-	-	-

Student workload (ECTS credits balance)

Student activity form	Student workload
Udział w zajęciach dydaktycznych/praktyka	30 h
Preparation for classes	20 h
przygotowanie projektu, prezentacji, pracy pisemnej, sprawozdania	50 h
Summary student workload	100 h
Module ECTS credits	3 ECTS

Additional information

Module content

Lectures

The lecture will cover the following subjects:

1.Introduction to the non-invasive methods in medicine (2h)
2.Review of the currently used non-invasive methods in medicine with technical/physical background (6h)
3.Electronics system used in the non-invasive methods in medicine (4h)
4.Telemedicine and e-Health systems (4h)
5.Further perspectives for non-invasive methods and e-Health systems (4h)

Laboratory classes

The laboratory classes will cover the following topics:

1. Exhaled breath analysis as a potential tool for non-invasive diagnostic method in medicine – analysis of breath samples with GC/MS systems, eNOSE and portable breath analyzers.
2. The project of an innovative device for non-invasive measurements in medicine – conception, research plan, prototyping.

Teaching methods and techniques:

Lectures: Nie określono
Laboratory classes: Nie określono

Warunki i sposób zaliczenia poszczególnych form zajęć, w tym zasady zaliczeń poprawkowych, a także warunki dopuszczenia do egzaminu:

Laboratory classes:
– Attendance is mandatory: Yes
– Participation rules in classes: Presence on project exercises is obligatory.
Lectures: lecture, projects, panel discussion, brainstorming
Project classes: project, panel discussion, brainstorming

Zasady udziału w poszczególnych zajęciach, ze wskazaniem, czy obecność studenta na zajęciach jest obowiązkowa:

Lectures:

– Attendance is mandatory: No
– Participation rules in classes: – Attendance is mandatory: No
- Participation rules in classes: Participation in the lectures is not obligatory, however, the activity at the lectures can affect the increase of the final grade.
Laboratory classes:
– Attendance is mandatory: Yes
– Participation rules in classes: – Attendance is mandatory: Yes
– Participation rules in classes: Presence on project exercises is obligatory.

Method of calculating the final grade
The final grade is average grade from reports of the laboratory classes.

Sposób i tryb wyrównywania zaległości powstałych wskutek nieobecności studenta na zajęciach:
This will be discussed at the beginning of the first class.

Prerequisites and additional requirements
Knowledge of the basic laws of physics. Knowledge of mathematics at the technical level of a university.

Recommended literature and teaching resources
This will be discussed at the beginning of the first lecture/class.

Scientific publications of module course instructors related to the topic of the module
1.
K. Staszek, A. Rydosz, E. Maciak, K. Wincza, S. Gruszczynski
Six-port microwave system for volatile organic compounds detection
Sensors & Actuators: B. Chemical 245 (2017) 882-894
DOI: 10.1016/j.snb.2017.01.194

2.
A. Rydosz, M. Ziabka, D. Michon, J. Kanak, W. Maziarz, T. Pisarkiewicz
Gas Sensing Characteristics of MoO3 Thin Films Prepared by Glacing Angle Magnetron Sputtering
Sensor Letters 15 (2017) 517-524
DOI: doi:10.1166/sl.2017.3837

3.
A. Rydosz
Sensors for Enhanced Detection of Acetone as a Potential Tool for Noninvasive Diabetes Monitoring
Sensors 18 (2018) 2298-2312
DOI: doi:10.3390/s18072298

4.
A. Szkudlarek, K. Kollbek, S. Klejna, A. Rydosz
Electronic sensitization of CuO thin films by Cr-doping for enhanced gas sensor response at low detection limit
Materials Research Express 5 (2018) 126406
https://doi.org/10.1088/2053-1591/aae0d8

5.
J. Sorocki, A. Rydosz
A Prototype of a Portable Gas Analyzer for Exhaled Acetone Detection
Applied Science 9 (2019) 2605
doi:10.3390/app9132605

6.
A. Rydosz, K. Marszałek
Analiza wydychanego powietrza jako nieinwazyjna metoda monitorowania cukrzycy

Rozdział w monografii: “Nowoczesne technologie XXI w. – przegląd, trendy i badania. Tom 1”
Tygiel tom 1 (2019) 230-243
ISBN: 978-83-65932-70-9
http://bc.wydawnictwo-tygiel.pl/publikacja/B748B37A-5C63-7A37-CE6D-B000648E2D2E

7.
A. Rydosz
A negative correlation between blood glucose and acetone measured in healthy and type I diabetes mellitus patient breath
Journal of Diabetes Science and Technology 9 (2015) 881-884

Additional information

None.