

**AGH**AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

Module name: **Advanced AI systems**

Academic year: **2019/2020** Code: **ZSDA-3-0125-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 hab. Bielecki Andrzej (bielecki@agh.edu.pl)**

### Module summary

The module covers selected issues of advanced artificial intelligence systems. The topics of advanced neural systems, advanced fuzzy inference systems and expert systems are discussed. Hybrid AI systems are considered as well. Applications in technology, industry, medicine and economics are discussed.

### 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)
Skills: he can			
M_U001	The student is able to assess whether a given problem can be solved with the help of AI.	SDA3A_U01	Activity during classes
M_U002	The student is able to discuss the problems related to AI.	SDA3A_U02	Activity during classes
Knowledge: he knows and understands			
M_W001	The student knows the current trends in artificial intelligence systems, both theoretical foundations and applications.	SDA3A_W01	Activity during classes
M_W002	The student knows the current methodology of scientific research of AI systems.	SDA3A_W02	Activity during classes

## Number of hours for each form of classes

Suma	Form of classes										
	Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
15	5	0	0	0	0	10	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
Skills: he can												
M_U001	The student is able to assess whether a given problem can be solved with the help of AI.	-	-	-	-	-	+	-	-	-	-	-
M_U002	The student is able to discuss the problems related to AI.	-	-	-	-	-	+	-	-	-	-	-
Knowledge: he knows and understands												
M_W001	The student knows the current trends in artificial intelligence systems, both theoretical foundations and applications.	+	-	-	-	-	-	-	-	-	-	-
M_W002	The student knows the current methodology of scientific research of AI systems.	+	-	-	-	-	-	-	-	-	-	-

## Student workload (ECTS credits balance)

Student activity form	Student workload
Udział w zajęciach dydaktycznych/praktyka	15 h
Preparation for classes	1 h
przygotowanie projektu, prezentacji, pracy pisemnej, sprawozdania	2 h
Realization of independently performed tasks	2 h
Summary student workload	20 h
Module ECTS credits	3 ECTS

## Additional information

## Module content

### Lectures

-

### Seminar classes

-

### Teaching methods and techniques:

Lectures: Lectures.

Seminar classes: Discussions and presentations.

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

Class attendance, participation in discussions, preparing presentations.

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

Lectures:

- Attendance is mandatory: No
- Participation rules in classes: Attendance at lectures.

Seminar classes:

- Attendance is mandatory: Yes
- Participation rules in classes: Participation in discussions and presentations.

### Method of calculating the final grade

Attendance at all classes is the basis for obtaining a satisfactory grade. If, moreover, the student actively participated in the discussions, he gets a good grade. If, in addition, the student has prepared a presentation, he receives a very good grade.

### Sposób i tryb wyrównywania zaległości powstałych wskutek nieobecności studenta na zajęciach:

Individual consultations.

### Prerequisites and additional requirements

Prerequisites and additional requirements not specified

### Recommended literature and teaching resources

Recommended literature – scientific articles – will be provided by the lecturer at the beginning of the semester in order to take into account the most recent scientific results. The basic knowledge can be found in:

Flasiński M. (2017),  
Introduction to Artificial Intelligence,  
Springer.

(Polish edition of the handbook:  
Flasiński M. (2011),  
Wstęp do sztucznej inteligencji,  
PWN,)

## **Scientific publications of module course instructors related to the topic of the module**

1. Brodowski S., Bielecki A., Filocha M. (2017),  
A hybrid system for forecasting 24-hour power load profile for Polish electric grid,  
Applied Soft Computing, vol.58, 527-539.
2. Bielecki A., Wójcik M. (2017),  
Hybrid system of ART and RBF neural networks for online clustering.  
Applied Soft Computing, vol.58, 1-10.
3. Bielecki A., Śmigielski P. (2017)  
Graph representation for two-dimensional scene understanding by the cognitive vision module,  
International Journal of Advanced Robotic Systems, vol.14(1), 1-14.
4. Bielecki A., Buratowski T., Śmigielski P. (2013),  
Recognition of two-dimensional representation of urban environment for autonomous flying agents,  
Expert Systems with Applications, vol.40, 3623-3633.
5. Bielecki A., Korkosz M., Zieliński B. (2008),  
Hand radiographs preprocessing, image representation in the finger regions and joint space width  
measurements for image interpretation,  
Pattern Recognition, vol.41, 3786-3798.
6. Bielecki A., Podolak I.T., Wosiek J., Majkut E. (1996),  
Phonematic translation of Polish texts by the neural network,  
Acta Physica Polonica, Series B., vol.27, 2253-2264.

## **Additional information**

None