



How to ensure human-centric and ethical operation of AI, its transparency and respect for the fundamental human rights while preserving the benefits of AI?

HCAI topics

- **HCAIM**
 - **Personal and institutional autonomy and freedom:** data security and privacy
 - **Human-centric data analysis by design:** MLOps, prior knowledge, explanation, active learning, machine teaching in cooperative intelligence, automated data analytics
 - **Human-centric knowledge engineering:** coding systems, ontologies, linked open data, summary statistics, automation of science (life sciences)
- **Classic ("existential risk")**
 - **Benevolent AI:** AI solutions for humans, societies, and mankind
 - **Trustworthy AI:** value compatibility, understandability
 - **AI safety:** formal methods in systems engineering
- **Human-computer interaction**
 - **Improved cognitive enhancers:** personal assistants in education, intelligent citizen and customer services, and decision support tools in personalized medicine
 - **Improved sensorial man-machine interfaces:** improved communication (speech, augmented reality) and human-computer interaction
 - **Improved sensorimotoric man-machine cooperation:** robotics, health-care assistance using wearable electronic devices, and automated driver assistance systems / autonomous vehicles
 - **Smart devices, smart cities:** IoT, sensor fusion for predictive maintenance

Didactic challenges

- How to mix engineering and human-centric (i.e. ethical, legal, social) knowledge in a single MSc course?
- How to demonstrate the human-centric approach in the whole design and development process of AI systems?
- How to apply the human-centric approach in practical exercises?
- How to prepare the students to comply with and monitor the legal regulations?

Goal: Deliver a 60 ECTS-credit Master's degree programme in AI with a human-centred focus and strong legal, ethical, sociological and other social science perspectives.
Realisation: As a supplementary programme *embedded* into our current 120 ECTS-credit Computer Science Master's programme. The majority of courses are held in Hungarian.

Course type	Course group	Course title	Neptun code	ECTS	Specialization				C	Elec tive	ECTS req.			
					S1	S2	S3	S4			min.	max.		
I. Basic	Common	1 Applied algebra and mathematical logic (autumn)	TE90MX75	5	5	5	5	5			5	5		
		Mathematical statistics (autumn)	VISZMA11	5										
	Stochastics (autumn)	TE90MX77	5											
	Specialization-dependent	2	Machine learning (autumn)	VIMIMA27	5	5						5	5	
			Machine learning (spring)	VIMIMA27	5									
		3	Deep learning (autumn)	VITMMA19	5	5								
			Deep learning in practice with Python and LUA (autumn)		4						4			
	Elective	4	Deep learning in visual computing (spring)	VIMMB10	5			5				4	14	
			Neural networks (spring)		4									
		5	The security of machine learning (spring)	VHIMB09	5					5				
			Trusted artificial intelligence and data analytics (spring)	VIMMB10	5					5			10	
		5	Artificial intelligence and ethics (spring; also autumn in 2023)	GTA1V105	2						2	2	2	
		6	Artificial intelligence and law (spring and autumn)	GTSV5106	2						2	2	2	
	7	Artificial general intelligence (autumn)	VIMIAV22	2						2	2	2		
Common	8	Project lab 2 (with AI content)		5	5	5	5				5	5		
		Thesis work 1 (with AI content)		10	10	10	10							
		Thesis work 2 (with HCAI content)		20	20	20	20					15	15	
A. HCAIM basic, total					94	50	40	45	40	10	18	45	60	
II. Optional	Common	10 Project lab 1 (with AI content)		5	5	5	5					0	5	
		Intelligent data analysis and decision support (spring)	VIMIMB09	5										
	Specialization-dependent	11	Business intelligence (autumn)	VIAUMA24	5		5						0	5
			AI-based human-machine interaction (autumn)	VITMMA23	5			5						
			Machine learning case studies (autumn)	VITMMA18	5		5							
12	Business intelligence lab (spring)	VIAUMB09	5		5							0	5	
	UX laboratory (spring)	VITMMB14	5			5								
13	Advanced data analysis methods lab (spring)	VITMMB10	5	5								0	5	
B. HCAIM optional, total					20	20	15	5	15	0	0	0	20	
HCAIM basic + specialization optional, total													45	80
III. Optional	Elective	Recognizable	14	Any HCAI related course (after prior arrangement)									15	0
HCAIM optional, elective courses to the minimum 60 ECTS														
Specializations and responsible departments														
S1	Major	Data science and artificial intelligence		Dept. of Measurement and Information Systems (MIT) - Dept. of Telecommunications and Media Informatics (TMIT)										
S2		Software development		Dept. of Automation and Applied Informatics (AAIT)										
S3		Visual informatics		Dept. of Control Engineering and Information Technology (IIT)										
S4	Minor	User experience – UX and interaction		Dept. of Telecommunications and Media Informatics (TMIT)										

How to obtain the 60 ECTS-credits* at BME VIK?

- I. HCAIM basic courses:** min. 45, max. 60 credits by completing a number of common, specialization-dependent or elective Computer Science courses, at least one course from each course group.
- II. HCAIM optional courses:** max. 20 credits by completing a number of common or specialization-dependent Computer Science courses, at most one course from each course group.
- III. HCAIM optional courses:** the missing credits (max. 15) may be obtained by completing a few HCAI-related elective courses (prior arrangement with the Dean's Office is required).

* ECTS: European Credit Transfer and Accumulation System

What you get (in addition to the knowledge gained)? A **HCAIM certification** in your Diploma, Section 6.1.1 with the following text:

The student completed the requisite learning outcomes of the Human-Centred Artificial Intelligence Master's (HCAIM) programme, defined by the EU project INEA/CEF/ICT/A2020/2267304.

Common HCAIM-approach

- 4 modules, composed of technical, practical and human-centric components, defined by
- Bodies of Knowledge and Skills
 - Lesson Plans,
 - Learning Events, and
 - Learning Outcomes.



Are you interested, would you like to join the HCAI Master's at BME VIK? Then register at <https://forms.office.com/e/H4CQFA5JWY> (with a BME Sharepoint / Directory account).

Completing the form does not imply any obligation and does not count as an application for the Master's programme.

Those who fill in the form will be added to an MS Teams group, and will be regularly informed about the latest developments in the HCAI Master's programme, and the project advancements that might concern them.

