Course description

Department/Unit /	KKY / USVP		**Academic Year**	2023/2024
Title	Introduction to Machine Perception		**Type of completion**	Exam
Accredited/Credits	Yes, 6 Cred.		**Type of completion**	Combined
Number of hours	Lecture 4 [Hours/Week] Tutorial 1 [Hours/Week]			

Occ/max	Status A	Status B	Status C			
Summer semester	0 / -	13 / -	1 / -	**Course credit prior to**	YES	
Winter semester	0 / -	0 / -	0 / -	**Counted into average**	YES	

Timetable	Yes	**Min. (B+C) students** 10
Language of instruction	Czech	**Repeated registration** NO
Optional course	Yes	**Semester taught** Summer semester
Evaluation scale	1|2|3|4	**Internship duration** 0
No. of hours of on-premise		**Ev. sc. – cred.** S|N
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.	
Periodicity	K	
Substituted course	None	
Preclusive courses	KKY/SVP and KKY/ZDO and KKY/ZDO-E	
Prerequisite courses	N/A	
Informally recommended courses	KKY/ZSUR	
Courses depending on this Course	N/A	

Course objectives:

The goal of the course is to present an overview of the basic knowledge of the machine perception, especially computer speech processing and computer vision.

Requirements on student

Coming to the exam will be conditioned by elaborating individual task from area of machine perception. This activity will be supported by written report. The exam will contain both written (test) and oral parts.

Content

Introduction to machine perception. Computer speech and computer vision. Speech processing for automatic speech recognition and synthesis. Automatic speech recognition. Automatic synthesis of speech. Voice dialogue systems. Speech understanding. Demonstration of speech technology tasks. Properties of image data. Processing of color information. Histograms. Image pre-processing - brightness modification, filtration, edge detection. Image pre-processing - geometric transformations, frequency analysis. Image segmentation, shape modifications. Image description methods. Image recognition. Demonstration of image processing and multi-modal human-machine communication tasks.

Fields of study

Studentům je k dispozici kurz v Google Classroom se všemi podstatnými informacemi a materiály.

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Jindřich Matoušek, Ph.D. (100%)
- **Lecturer:** Ing. Miroslav Jiřík, Ph.D. (100%), Doc. Ing. Jindřich Matoušek, Ph.D. (100%), Prof. Ing. Josef Psutka, CSc. (100%), Doc. Ing. Miloš Železný, Ph.D. (100%)
- **Tutorial lecturer:** Ing. Miroslav Jiřík, Ph.D. (100%), Ing. Petr Neduchal, Ph.D. (100%), Prof. Ing. Josef Psutka, CSc. (100%), Ing. Luboš Šmídl, Ph.D. (100%), Doc. Ing. Miloš Železný, Ph.D. (100%)

Literature

- **Basic:** Psutka, Josef. *Komunikace s počítačem mluvenou řečí*. Praha : Academia, 1995. ISBN 80-200-0203-0.
- **Basic:** Psutka, Josef. *Mluvíme s počítačem česky*. Praha : Academia, 2006. ISBN 80-200-1309-1.
- **Basic:** Šonka, Milan; Hlaváč, Václav. *Počítačové vidění*. Praha : Grada, 1992. ISBN 80-85424-67-3.
- **Extending:** Shapiro, Linda G.; Stockman, George C. *Computer vision*. Upper Saddle River : Prentice Hall, 2001. ISBN 0-13-030796-3.
- **Extending:** Sonka, Milan; Hlavac, Vaclav; Boyle, Roger. *Image processing, analysis, and machine vision*. Toronto : Thomson, 2008. ISBN 978-0-495-08252-1.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Preparation for an examination (30-60)	45
Contact hours	52
Presentation preparation (report) (1-10)	10
Preparation for comprehensive test (10-40)	30
Individual project (40)	35
Total:	**172**

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

Combined exam

Seminar work

Skills - skills achieved by taking this course are verified by the following means:

Combined exam

Skills demonstration during practicum

Competences - competence achieved by taking this course are verified by the following means:

Combined exam

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

disponovat základními znalostmi z lineární algebry, pravděpodobnosti a statistiky

absolvovat předmět Základy strojového učení a rozpoznávání (KKY/ZSUR)

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

programovat v některém z běžných programovacích jazyků

používat aktivně matematické metody získané dřívějším studiem

používat MATLAB

dovede analytciky přemýšlet

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

N/A

N/A

N/A

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Lecture

Lecture with visual aids

Self-study of literature

Skills - the following training methods are used to achieve the required skills:

Lecture

Textual studies

Seminar

Competences - the following training methods are used to achieve the required competences:

Lecture

Seminar

Self-study of literature

learning outcomes

Knowledge - knowledge resulting from the course:

vytypovávat oblasti pro nasazování systémů strojového vnímání prostředí a zároveň se podílet na jejich instalaci

Skills - skills resulting from the course:

prokazuje základní dovednosti v oblasti zpracování mluvené řeči (automatické rozpoznávání, počítačová syntéza, hlasový dialog)

prokazuje základní dovednostmi v oblasti zpracování obrazové informace (počítačové vidění)

Competences - competences resulting from the course:

N/A

N/A

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Cybernetics and Control Engineering	Bachelor	Full-time	Artificial Intelligence and Automation	1	2019	2023	Povinně volitelné předměty	B	2	LS
Cybernetics and Control Engineering	Bachelor	Full-time	Artificial Intelligence and Automation	1	2023	2023	Povinně volitelné předměty	B	2	LS
Cybernetics and Control Engineering	Bachelor	Full-time	Automatic Control and Robotics	1	2019	2023	Volitelné předměty	C	3	LS
Cybernetics and Control Engineering	Bachelor	Full-time	Automatic Control and Robotics	1	2023	2023	Volitelné předměty	C	3	LS