Semmelweis University, Faculty of Medicine – single, long-cycle medical training
Name of the host institution (and any contributing institution):
Traumatológiai Klinika

Name of subject: Mesterséges intelligencia a diagnosztikában és műtéti tervezésben
in English: Artificial Intelligence in Diagnostics and Surgery Planning
in German: Künstliche Intelligenz in der Diagnostik und Operationsplanung

Credit value: 1
Semester: 1. szemeszter, 2. szemeszter, 3. szemeszter, 4. szemeszter, 5. szemeszter, 6. szemeszter, 7. szemeszter, 8. szemeszter, 9. szemeszter, 10. szemeszter, 11. szemeszter, 12. szemeszter
(in which the subject is taught according to the curriculum)

Hours per week	Lecture	Practical lesson	Seminar
1.0	0.0	0.0	1.0

Hours per semester	Lecture	Practical lesson	Seminar
0.0	0.0	0.0	0.0

Type of course:
elective

Academic year:
2025/26

Language of instruction (for optional and elective subjects):
English

Course code:
AOSTRA882_1A
(in the case of a new course, to be completed by the Dean's Office, following approval)

Course coordinator name: Dr. Bodzai Tamás János (klinikaigazgató)
Course coordinator location of work, telephone availability: Semmelweis University Clinic for Traumatology, e-mail: office.trauma@semmelweis.hu, Tel: 06 20/825-8680
Course coordinator position: Head of department, associate professor
Course coordinator Date and number of habilitation: In progress

Objective of instruction and its place in the curriculum:

To gain a user-level understanding of the technology of artificial intelligence, more specifically deep learning; its methods and areas of application in medical science and practice. The course is theoretical in nature, there will be no practical exercises.

Method of instruction (lecture, group work, practical lesson, etc.):

Lectures

Competencies acquired through completion of course:

Student completing this course will gain an understanding of the working principles of artificial intelligence and perform as high-level professional users of medical equipment and assistive technology utilizing such. The course can also serve as an entry point for students who might decide to delve deeper into this field later on.

Course outcome (names and codes of related subjects):

Prerequisites for course registration and completion: (CODE):

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In the case of multi-semester courses, position on the possibility of and conditions for concurrent registration:

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The number of students required to start the course (minimum, maximum), student selection method:

Min: 10

Max: 120

Selection method: first come first served

Detailed course syllabus (if the course can be divided into modules, please indicate): (Theoretical and practical instruction must be broken down into hours (weeks), numbered separately; names of instructors and lecturers must be listed, indicating guest lecturers/instructors. It cannot be attached separately! For guest lecturers, attachment of CV is required in all cases!)

Week 1   The Concept of Artificial Intelligence and Examples of Medical Applications – Introductory Lecture; *Lecturer: Peter Szoldan*

Week 2   Working Principles and Architecture of Neural Networks; *Lecturer: Peter Szoldan*

Week 3   Challenges and Solutions of Training Neural Networks; *Lecturer: Peter Szoldan*

Week 4   Similarities and Differences of Architectures and Operation of the Central Nervous System and Artificial Intelligence; *Lecturer: Balázs Szegedy, PhD, Research Mathematician of the Rényi Alfréd Mathiematical Research Insitute of the Hungarian Academy of Sciences, Fulkerson Prize recipient (2012), "Momentum" Research Fellowship recipient (2014)*

Week 5   One-Dimensional Data Processing with Convolutional Neural Networks; Electrocardiogram, Audio, Speech, and Text with Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 6   Text Processing, Translation, Text Generation with Artificial Intelligence; Operating Principles of ChatGPT; Transformer Networks; Reinforcement Learning; *Lecturer: Peter Szoldan*

Week 7   Two-Dimensional Image and Video Processing with Convolutional Neural Networks; *Lecturer: Peter Szoldan*

Week 8   Three-Dimensional Image Processing with Convolutional Neural Networks; Structure of CT and MR Medical Images; Radiomics and Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 9   Artificial Intelligence in the Practice of Radiological Diagnostics; *Lecturer: Dr. Egyed Zsófia PhD, Head of Radiology Department, Uzsoki Hospital*

Week 10 Real-world Examples of Design and Execution of Therapy with Artificial Intelligence; Mistakes by Artificial Intelligence and their Reasons; Medical Practitioner's Responsibility; *Lecturer: Peter Szoldan*

Week 11   Operation Planning with Artificial Intelligence: Ultra-Fresh Osteochondral Allograft Donor Matching and Prosthetics Design; *Lecturers: Prof. Dr. László Hangody, Dr. György Hangody*

Week 12   Practical Challenges of Collecting a Training Set: Case Study of the Training of the Ultra-Fresh Osteochondral Allograft Donor Matching Artificial Intelligence; *Lecturer: Peter Szoldan*

Week 13   The Future of Artificial Intelligence in Medicine; *Lecturer: Peter Szoldan*

Week 14   Exam Prep Q&A Session; *Lecturer: Peter Szoldan*

Week 15   Written MCQ electronic exam; *Lecturer: Peter Szoldan*

Other courses with overlapping topics (obligatory, optional, or elective courses) in interdisciplinary areas. To minimalize overlaps, topics should be coordinated. Code(s) of courses (to be provided):

Requirements for attendance, options for making up missed sessions, and method of absence justification:

Participation in at least 75% of the seminars is required.

Assessment methods during semester (number, topics, and dates of midterms and reports,

method of inclusion in the course grade, opportunities for make-up and improvement of marks):
(number, topics, and dates of midterms and reports, method of inclusion in the course grade, opportunities for make-up and improvement of marks)

No assessments during the study period.

Number and type of individual assignments to be completed, submission deadlines:

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Requirements for the successful completion of the course:

Participation in at least 75% of the seminars and a successful completion of the end-term exam.

Type of assessment:
gyakorlati jegy_en

Examination requirements (list of examination topics, subject areas of tests, lists of mandatory parameters, figures, concepts and calculations, practical skills, optional topics for the project assignment recognized as an exam and the criteria for its completion and evaluation)

A satisfactory knowledge of the provided study material, contents of the electronically provided material and contents of the lectures.

Method and type of grading (Share of theoretical and practical examinations in the overall evaluation. Inclusion of the results in the end-of-term assessment. Possibilities of and conditions for offered grades.): (Share of theoretical and practical examinations in the overall evaluation, Inclusion of the results in the end-of-term assessment, Possibilities of and conditions for offered grades)

Term-grade written MCQ electronic exam (multiple choice test), on Semmelweis University's E-learning portal (Moodle) at the NET Building. 5 scale grading (1-5).

Possibility to retake the test: at least one more time, but a maximum of two times before the end of the semester.

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List of coursebooks, textbooks, study aids and literature facilitating the acquisition of knowledge to complete the course and included in the assessment, precisely indicating which requirement each item is related to (e.g., topic by topic) as well as a list of important technical and other applicable study aids; possibility of individual or group student consultation, if available:

Online resources:

Required	Yes
Title	
Link	https://itc.semmelweis.hu/moodle/

Signature of habilitated instructor (course coordinator) announcing the course:

Signature of the director of the host institution:

Date of submission: